

A REVISION OF THE NORTH AMERICAN ANTS OF THE GENUS MYRMICA LATREILLE WITH A SYNOPSIS OF THE PALEARCTIC SPECIES. II.

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The preceding part with this title was published in the Annals of the Entomological Society of America, September, 1947 (40: 437-474, 3 text figs.). It treated the genus as a whole (keys, distribution, affinities, etc.) and thirteen species comprising fifty described forms. The species were palearctic except for three forms of *Myrmica laevinodis* Nylander found in three localities on the east coast of North America which were probably importations in historic times.

The present part deals with seven species comprising fifty-four described forms. Seven of the latter are nearctic and include three of the common ants of North America (*Myrmica lobicornis fracticornis* Emery, *M. sabuleti americana* Weber and *M. schencki emeryana* Forel). They are North American equivalents of common Eurasian species. Locality lists of these are included and a brief account of their biology, variations and anomalies.

THE HOLARCTIC SPECIES OF MYRMICA LATREILLE

(Continued)

Myrmica sulcinodis Nylander

M. Sulcinodis Nylander, Acta. Soc. Sc. Fennicae, 1846, 2: 934-935, ♀ ♀; Finzi, Boll. Soc. Adr. Sc. Nat., Trieste, 1926, 29: 86-88, fig. 3, ♀ ♂; Karawajew, Konowia, 1926, 6: 283; Störcke, De Levende Natuur, 1927, 13; Kuznetsov-Ugamskij, Zool. Anz., 1929, 83: 45.

Worker (after Nylander): Length ca. 2 lin.

In general, similar to the preceding (*M. lobicornis*), but paler, antennal scapes and pedicel otherwise formed. Frontal area obscured, traversed by striae. Frontal laminae a little less dilated below the margins. Antennal scapes a little curved at the base, nevertheless more than in *M. laevinodis*.

Epinotal spines very long, subulate. Pedicel longitudinally sulcate with coarse sulcations, about 12 in number and regular (not confused as in *laevinodis*).

Female (after Nylander): Length $2\frac{1}{2}$ lin.

Similar to the preceding female (*laevinodis*) with the differences noted in the worker. Head as in the worker. Epinotal spines long, subulate, slightly curved. Pedicel laterally, regularly and deeply sulcate. (Wings absent).

Male (after Emery): Length 5-5.5 mm.

Color as in *rubra*; sculpturing rougher and thicker; the entire thorax dull and striate; petiole wrinkled, somewhat dull; part of the postpetiole

shining. Antennae more slender than in *M. rubra*, the scape not quite half as long as the funiculus (equal to the 6 following joints together); club indistinctly 4-5-jointed.

Distribution: Northern Europe and Asia and in the Pyrenees, Alps, Apennines, Balkans and Caucasus.

Myrmica sulcinodis subsp. *nigripes* Ruzsky

M. sulcinodis var. *nigripes* Ruzsky, Berlin. Ent. Zeitschr., 1896, 4: 73, ♀ ♂; Finzi, Boll. Soc. Adr. Sc. Nat., Trieste, 1926, 29: 88.

Worker (after Ruzsky):

Differing from the typical form mainly through the black or blackish brown legs; tarsi light, color in general darker, the body more wrinkled.

Type Locality: Orenburg Urals: High ridge of the Kumatsch.

"Males and females in July" (not described).

According to Emery the worker thorax is ferruginous, the head, pedicel and gaster blackish brown, the antennae and legs brown; the sculpturing is stronger and more regular than in the type; the petiolar node somewhat shorter.

The male is darker and more strongly sculptured than in the type; the petiole is more strongly furrowed longitudinally, the postpetiole thickly punctate, dull.

Emery lists South Russia and West Siberia.

Myrmica sulcinodis var. *sulcinodo-ruginodis* Forel

M. sulcinodis var. *sulcinodo-ruginodis* Forel, Fourmis Suisse, 1874: 77, ♀; Finzi, Boll. Soc. Adr. Sc. Nat., Trieste, 1926, 29: 88.

Forel erected this name for the ants intermediate between *sulcinodis* and *M. rubra* (= *M. ruginodis*).

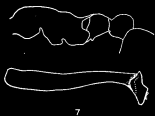
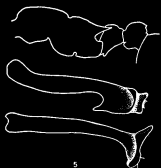
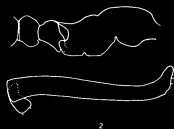
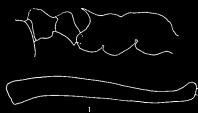
Myrmica sulcinodis var. *sulcinodo-rugulosa* Nasonov

M. sulcinodis var. *sulcinodo-rugulosa* Nasonov, Trav. Lab. Zool. Univ. Moscow, 1889, 4: 35, ♀.

Similarly erected by Nasonov for the ants intermediate between *sulcinodis* and *M. rugulosa*.

EXPLANATION OF PLATE I

Fig. 1. Body outline and antennal scape of the worker of *Myrmica laevinodis* var. *bruesi* Wheeler. Fig. 2. Body outline and antennal scape of the worker of *Myrmica scabrinodis* subsp. *mexicana* Wheeler. Fig. 3. Body outline and antennal scape of the worker of *Myrmica lobicornis* subsp. *fracticornis* Emery. Fig. 4. Body outline and antennal scape of the worker of *Myrmica sabuleti* subsp. *americana* Weber. Fig. 5. Body outline and antennal scape of the worker of *Myrmica sabuleti* subsp. *hamulata* Weber. The lamina at the bend of the scape is prolonged into a hook is diagnostic. Fig. 6. Body outline and antennal scape of the worker of *Myrmica sabuleti* subsp. *nearctica* Weber. The lamina at the bend of the scape extends farther than in *americana*. Fig. 7. Body outline and antennal scape of the worker of *Myrmica schencki* subsp. *emeryana* Forel. Fig. 8. Body outline and antennal scape of the worker of *Myrmica schencki* subsp. *tahoensis* Wheeler.



***Myrmica sulcinodis* var. *sulcinodo-scabrinodis* Forel**

M. sulcinodis var. *sulcinodo-scabrinodis* Forel, Fournis Suisse, 1874: 77, ♀; Starcke, "De Levende Natuur," 1927: 13, ♀.

A name for the ants intermediate between *M. sulcinodis* and *M. scabrinodis*.

***Myrmica sulcinodis* subsp. *vicaria* Kuznetzov-Ugamskij**

M. sulcinodis subsp. *vicaria* Kuznetzov-Ugamskij, "The Ants of the South Ussuri Region (in Russian)," 1928: 33, figs. 13, 14, ♀.

Worker (after Kuznetzov-Ugamskij): Length 3.7-4 mm.

Epinotal spines shorter than the basal surface of the epinotum; broad at the base, then strongly tapering to a pointed apex. Smaller than the typical form: length 4-4.5 mm. Declivous surface of the epinotum infraspinally smooth and strongly shining. Metasternal angles somewhat produced dorsally and pointed.

Type Locality: Ssutscham.

***Myrmica myrmecophila* Wasmann**

M. myrmecophila Wasmann, Biol. Centralbl., 1910, 30: 516, ♀; Finzi, Boll. Soc. Adr. Sc. Nat., Trieste, 1926, 29: 91.

Ergatoid Female (after Wasmann and Finzi): Length 5.2 mm.

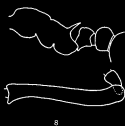
Head clearly smaller and lighter (than in *sulcinodis*), yellowish brown, a brownish cast only in middle of frons. Occiput bears medially an ocellus which is much smaller than in ♀ and ♂ *sulcinodis*. Frontal area more concave. Thorax as in ♂ *sulcinodis*, but gaster much larger (2.4 mm. long, 1.3 mm. broad). Epinotal spines longer than in *sulcinodis*, extending to middle of petiole, horizontal, parallel. Postpetiole, from above, twice as broad as the petiole. Circumference of gaster equal to that of a queen *sulcinodis*, in the same colony, which is almost 7 mm. long, while the head is only half the size. Sculpture of head and thorax corresponds to that of ♀ and ♂ *sulcinodis* but somewhat less coarse. Upright yellow hairs somewhat longer and thicker.

Tyrol: Arlberg Pass, 1,800 m., 27.VIII.91, from a flourishing *M. sulcinodis* colony (E. Wasmann).

Wasmann believed this peculiar ant may have been parasitic on the *sulcinodis*. Unfortunately, no other records are known.

EXPLANATION OF PLATE II

Fig. 1. Body outline and antennal scape of the worker of *Myrmica brevinodis* Emery. Fig. 2. Body outline and antennal scape of the worker of *Myrmica brevinodis* subsp. *sulcinodoides* Emery. Fig. 3. Body outline and antennal scape of the worker of *Myrmica brevinodis* subsp. *kuschei* Wheeler. Fig. 4. Body outline and antennal scape of the worker of *Myrmica brevinodis* subsp. *brevispinosa* Wheeler. Fig. 5. Body outline and antennal scape of the worker of *Myrmica brevinodis* subsp. *discontinua* Weber. Fig. 6. Body outline and antennal scape of the worker of *Myrmica wheeleri* Weber. Fig. 7. Body outline and antennal scape of the worker of *Myrmica punctiventris* Roger. Fig. 8. Body outline and antennal scape of the worker of *Myrmica punctiventris* subsp. *pinetorum* Wheeler.



Myrmica lobicornis Nylander

M. lobicornis Nylander, Act. Soc. Sc. Fennicae, 1846, 2: 933-934, pl. 18, figs. 32, 33, ♀ 9; Starcke, Ent. Bericht, Nederl. Ent. Vereen., 1926, 7: 89-91; Starcke, "De Levende Natuur," 1927: 15; Starcke, Tijdschr. Ent., 1927, 70: 73-84, 5 figs; Karawajew, Konowia, 1926, 5: 283; Finzi, Boll. Soc. Adr. Sc. Nat., Trieste, 1926, 29: 106-107, fig. 13; Santschi, Rev. Suisse Zool., 1931, 38: 347-348.

Worker (after Nylander): Length $1\frac{3}{4}$ -2 lin.

Similar to the preceding (*M. scabrinodis*) but less strongly robust, color and shape of the scape also distinct. Mandibles pale ferruginous, at the extreme apex fuscous. Frontal area conspicuous. Frontal lamina as in the preceding, margins dilated, a little reflexed. Antennae as dark as the mandibles, rufous; scape with compressed lobe which is a little concave, in the form of an almost semi-circular lamina, and situated in a transverse position above the bend near the base. This lobe is a little larger, more compressed, and not obliquely situated as in the preceding. Head laterally reticulate-rugose. Thorax and pedicel longitudinally, coarsely and roughly sculptured, sordid brownish ferruginous; nodes coarsely and irregularly rugose. Apex of gaster pale.

Female (after Nylander): Length $2\frac{1}{2}$ lin.

Similar to the female of the preceding (*M. scabrinodis*), but colored otherwise and scape distinct.

Apex of the mandibles pale rufous. Frontal area, frontal laminae and antennal scapes as in the worker. Thorax fuscous, pronotum anteriorly with coarse, irregular rugosities, otherwise longitudinally and coarsely striate, base of the sculpturing and apically faintly brownish-rufous. Nodes fuscous, brownish-rufous between the coarse, sub-longitudinal rugosities. Wings as in the preceding, but tinted with still paler cinereous; $2\frac{1}{4}$ lin. long. Legs shining, pale ferruginous, with long yellowish pubescence. Apex of gaster pale fusco-rufescent.

Male (after Emery):

Very distinguishable in the formation of the antennae: the funiculus is short, the scape about half as long as the funiculus (equal in length to the following six segments together) and, at the basal third, angularly bent.

Distribution: North Europe to Central Asia; Alps, Apennines.

Figure 32a of Nylander's description is of an antennal scape in posterior view; the scape is bent obtusely and the lamina appears as a high, but rounded, tubercle in profile. Figure 32b shows the lamina from above; it appears transversely elliptical with the basal margin

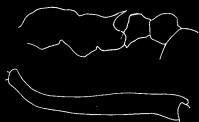
EXPLANATION OF PLATE III

Fig. 1. Body outline and antennal scape of the worker of *Myrmica rubra* (L.). Fig. 2. Body outline and antennal scape of the worker of *Myrmica rubra* var. *silvestris* Wheeler. Fig. 3. Body outline and antennal scape of the worker of *Myrmica rubra* subsp. *yoshiokai* Weber. Fig. 4. Body outline and antennal scape of the worker of *Myrmica laevinodis* Nylander. Fig. 5. Body outline and antennal scape of the worker of *Myrmica smythiesi* Forel, cotype. Fig. 6. Body outline and antennal scape of the worker of *Myrmica smythiesi* subsp. *dshungarica* Ruzsky. Fig. 7. Body outline and antennal scape of the worker of *Myrmica smythiesi* subsp. *himalayana* Weber. Fig. 8. Body outline and antennal scape of the worker of *Myrmica smythiesi* subsp. *hecate* Weber.



1

2



3



4



5



6



7



8

straight. Figure 33 shows the frontal area as an isosceles triangle with concave basal margin.

The *lobicornis* male genitalia are similar to those of *scabrinodis*, *sabuleti*, *schenck*; and *brevinodis*. For this reason and because of frequent intermediate conditions in the worker castes they may perhaps be considered closely related species capable of hybridizing.

***Myrmica lobicornis* subsp. *alpestris* Arnoldi**

M. lobicornis subsp. *alpestris*, Arnoldi, Folia Zool. et Hydrobiol. (Riga), 1934, 6(2): 168, ♀ ♂.

A form from the U. S. S. R. unknown to me.

***Myrmica lobicornis* subsp. *alpina* Stårcke**

M. lobicornis subsp. *alpina* Stårcke, Tijdschr. Ent., 1927, 70: 80-81, fig. 2, ♀ ♀.

Val Aosta.

For a description of this form see the reference above.

***Myrmica lobicornis* subsp. *angustifrons* Stårcke**

M. lobicornis subsp. *angustifrons* Stårcke, Tijdschr. Ent., 1927, 70: 81-82, fig. 3, ♀ ♀.

England: Surrey: Weybridge (H. Donisthorpe).

For a description of this form see the reference above.

***Myrmica lobicornis* subsp. *apennina* Stårcke**

M. lobicornis subsp. *apennina* Stårcke, Tijdschr. Ent., 1927, 70: 82-83, ♀.

Apennines: Monte Cimone (C. Menozzi).

For a description of this form see the reference above.

***Myrmica lobicornis* subsp. *arduennae* Bondroit**

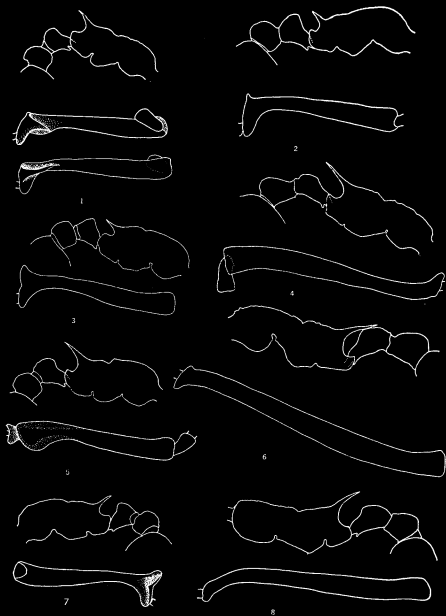
M. lobicornis var. *arduennae* Bondroit, Ann. Soc. Ent. Belg., 1911, 55: 12, ♀ ♀ ♂.
M. lobicornis st. *arduennae* (Bondroit), Santschi, Rev. Suisse Zool., 1931, 38: 349-350, fig. 4.

Belgium: Hockay.

For descriptions of this form see the references above.

EXPLANATION OF PLATE IV

Fig. 1. Body outline and antennal scape of the worker of *Myrmica scabrinodis* Nylander of Europe. Fig. 2. Body outline and antennal scape of the worker of *Myrmica moravica* Soudek. Fig. 3. Body outline and antennal scape of the worker of *Myrmica lobicornis* Nylander of Europe. Fig. 4. Body outline and antennal scape of the worker of *Myrmica rita* subsp. *serica* Wheeler. Fig. 5. Body outline and antennal scape of the worker of *Myrmica sabuleti* Meinert of Europe. Fig. 6. Body outline and antennal scape of the worker of *Myrmica rita* subsp. *formosae* Wheeler. Fig. 7. Body outline and antennal scape of the worker of *Myrmica schencki* Emery of Europe. Fig. 8. Body outline and antennal scape of the worker of *Myrmica rita* subsp. *indica*, n. subsp.



***Myrmica lobicornis* subsp. *deplanata* Ruzsky**

M. scabrinodis lobicornis var. *deplanata* Ruzsky, Formic. Imp. Rossici, 1905: 700, ♀.

Worker (after Ruzsky):

Differing from the typical *lobicornis* in the near absence of a meso-epinotal impression so that the thorax, in profile, is evenly convex. Epinotal spines shorter, thin, acute. Bend of the antennal scape with a sharper tooth or small, sharp lobe. Postpetiole dorsally nearly smooth, weakly shining and with finer, thinner reticulations. Pilosity sparse, almost entirely absent on the thorax and dorsal surface of the gaster.

Type Localities: Caucasus, Krim, Gouv. Saraton on the steppe; steppe near Orenburg.

***Myrmica lobicornis* subsp. *foreli* Santschi**

M. lobicornis st. *foreli* Santschi, Rev. Suisse Zool., 1931, 38: 348-349, ♀♀.

Type Locality: Tyrol: Schluderbach (Forel). For a description of this form from the Forel collection see the reference above.

***Myrmica lobicornis* subsp. *fracticornis* Emery**

M. scabrinodis scabrinodis var. *fracticornis* Emery, Zool. Jahrb. Abth. f. System., 1894, 8: 313, ♀.

M. rubra scabrinodis var. *fracticornis* Wheeler, "Ants," 1910: 566, ♀.

M. scabrinodis scabrinodis detritinodis Emery, Zool. Jahrb. Abth. f. Syst., 1894, 8: 316, ♀.

M. rubra scabrinodis var. *detritinodis* Wheeler, "Ants," 1910: 566, ♀.

M. sabuleti var. *lobifrons* (In Part), Pergande, Proc. Washington Acad. Sc., 1900, 2: 521, ♀.

M. rubra scabrinodis var. *lobifrons* (In Part) Wheeler, "Ants," 1910: 566, ♀.

M. scabrinodis lobicornis var. *lobifrons* (In Part) Wheeler, Bull. Mus. Comp. Zool., 1917, 61: 17, 21, ♀.

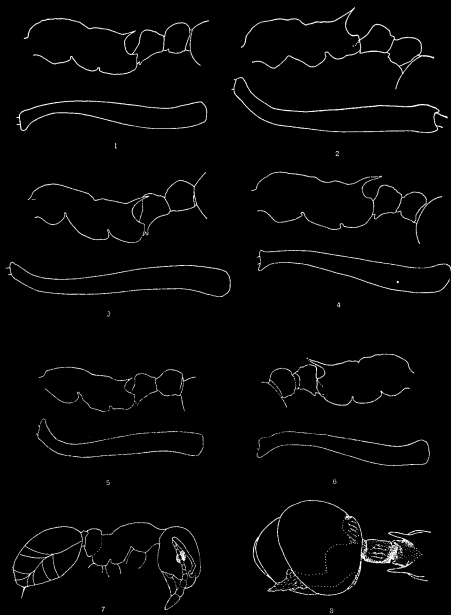
M. rubra scabrinodis var. *glacialis* Forel, Ann. Soc. Ent. Belg., 1904, 48: 154; Wheeler, "Ants," 1910: 566, ♀.

M. scabrinodis lobicornis var. *glacialis* Wheeler, Proc. Amer. Acad. Arts Sc., 1917, 52: 504, ♀; Wheeler, Bull. Mus. Comp. Zool., 1917, 61: 21, ♀.

The following descriptions are of a worker cotype from New Haven, Connecticut, and of all castes of a single colony from the Santa Catalina Mountains, Arizona.

EXPLANATION OF PLATE V

Fig. 1. Body outline and antennal scape of the worker of *Myrmica rugosa* Mayr. Fig. 2. Body outline and antennal scape of the worker of *Myrmica rugosa* subsp. *arizana* Wheeler. Fig. 3. Body outline and antennal scape of the worker of *Myrmica pachei* Forel, cotype. Fig. 4. Body outline and antennal scape of the worker of *Myrmica kurokii* Forel. Fig. 5. Body outline and antennal scape of the worker of *Myrmica bergi* Ruzsky, cotype. Fig. 6. Body outline and antennal scape of the worker of *Myrmica sulcinodis* Nylander. Fig. 7. Body outline of an anomalous worker of *Myrmica brevinodis* subsp. *brevispinosa* Wheeler from Montana. The petiole is fused with the epinotum, which lacks the customary spines, and the postpetiole appears to be absent. Fig. 8. Dorsal view of the abdomen of an anomalous alate female of *Myrmica brevinodis* Emery from North Dakota. The red petiole is normal; the red post-petiole, however, is asymmetrically fused with the anterior portion of the brown first gastric segment and its amorphous remains extend out between the first and second gastric segments.



Worker (Cotype): Length 4.9 mm.

Antennal scapes exceeding posterior margin of head by a distance less than the distal diameter of the scape; seen from above, in the form of a drawn-out sigmoid curve, at the base laterally compressed, with a rounded, more or less upright, lamina which extends completely around the base in a transverse position, and extends along both sides of the scape to a distance about equal to the width of the transverse section; seen from behind, the scape is sharply bent at the base in an obtuse angle, the lamina appearing as a slight tooth; distal diameter nearly twice that of the proximal portion; antennal club indistinctly 4-jointed, funicular joints 1 and 2 together equal in length to joints 3-5 together. Thorax, in profile, evenly convex to the deep and distinct mesoepinotal suture; epinotal spines moderate in length, directed upwards at an angle of about 30 degrees and backwards, straight and acute, shorter than the epinotal declivity ventral to them; from above, moderately diverging, slightly longer than the distance between their bases. Petiole in profile slightly longer from apex of ventral tooth to postpetiole than it is high, with anterior face a little concave, rounded antero-dorsal and postero-dorsal angles and nearly flat top. Postpetiole in profile about 0.7 as long as high, with anteriorly produced ventral lobe; from above subglobular. Gaster long-ovate. Legs moderate in length.

Surface of head moderately sculptured, median dorsal area longitudinally rugose, sides and posterior surface irregularly reticulate-rugose, whole surface thickly and conspicuously punctate at the base of the sculpturing; frontal area clearly delimited, punctate, striated at the margins. Surface of the thorax deeply vermiculate-rugose, more regularly rugose posteriorly and less deeply sculptured on the sides. Surfaces of the petiole irregularly vermiculate, distinctly punctate. Dorsal surface of the postpetiole longitudinally and concentrically rugose-punctate, a median dorsal area somewhat smoother, lateral surfaces rugose. Gaster smooth and shining.

Pilosity moderate, hairs of medium length, suberect, acute, except on the dorsal surface of the thorax, where truncate.

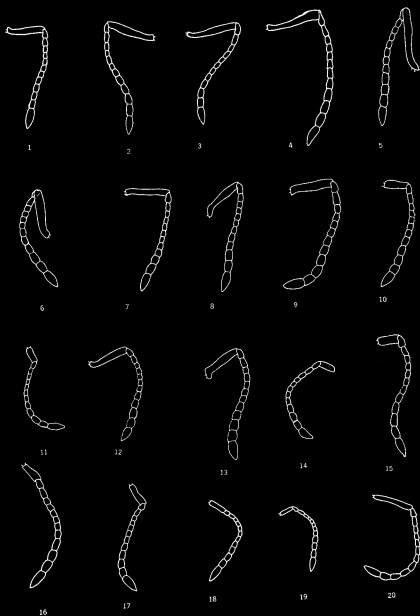
Color ferruginous, dorsal surface of the head and posterior surface of the 1st gasteric segment more brownish.

Worker (Arizona specimens): Length 3.9-6 mm.

EXPLANATION OF PLATE VI

Antennae of males of species of *Myrmica*:

Fig. 1. *Myrmica laevinodis* Nylander. Fig. 2. *Myrmica laevinodis* var. *bruesi* Wheeler. Fig. 3. *Myrmica smythiesi* subsp. *dshungarica* Ruzsky. Fig. 4. *Myrmica sulcinodis* Nylander. Fig. 5. *Myrmica sulcinodis* var. *sulcinodoscabrinodis* Forel. Fig. 6. *Myrmica scabrinodis* subsp. *mexicana* Wheeler. Fig. 7. *Myrmica lobicornis* Nylander. Fig. 8. *Myrmica lobicornis* subsp. *fracticornis* Emery. Fig. 9. *Myrmica sabuleti* subsp. *americana* Weber. Fig. 10. *Myrmica sabuleti* subsp. *hamulata* Weber. Fig. 11. *Myrmica sabuleti* subsp. *nearctica* Weber. Fig. 12. *Myrmica schencki* Emery. Fig. 13. *Myrmica schencki* subsp. *emeryana* Forel. Fig. 14. *Myrmica schencki* subsp. *tahoensis* Wheeler. Fig. 15. *Myrmica brevinodis* Emery. Fig. 16. *Myrmica brevinodis* subsp. *sulcinodoides* Emery. Fig. 17. *Myrmica brevinodis* subsp. *brevispinosa* Wheeler. Fig. 18. *Myrmica wheeleri* Weber. Fig. 19. *Myrmica punctiventris* subsp. *pinetorum* Wheeler. Fig. 20. *Myrmica punctiventris* Roger.



General characters of the cotype with the following variations: The lateral extensions of the lamina at the bend of the antennal scape may be practically absent; seen from above the epinotal spines may be distinctly shorter than the distance between their bases and may be blunt and subparallel; the anterior face of the petiole may be plane; the postpetiole may be twice as high as long with the anteriorly produced ventral lobe acutely angular.

The frontal area may be entirely striate, though clearly delimited; the sculpturing of the anterior part of the thorax may be deeply and irregularly reticulate; the sculpturing of the pedicel may be much feebler though conspicuously punctate and the rugosity of the postpetiole not distinctly concentric.

The pilosity may be comparatively abundant.

The color of the body ranges from ferruginous to a dark brown, almost black, with the appendages somewhat lighter but still quite dark brown.

Female: Length 4.7–6.4 mm.

Similar to the worker, with the usual sexual differences, including the following:

Epinotal spines distinctly shorter than the part of the epinotal declivity ventral to them, with blunt tips, and, from above, diverging.

Sculpture of the pronotum coarsely reticulate anteriorly, becoming rugose posteriorly and on the remainder of the sides; scutum of mesonotum anteriorly with a small smooth median area from which radiate scattered rounded vermiculations, postero-medially becoming more or less parallel rugosities; base of the sculpturing of the body, exclusive of the gaster, thickly punctate.

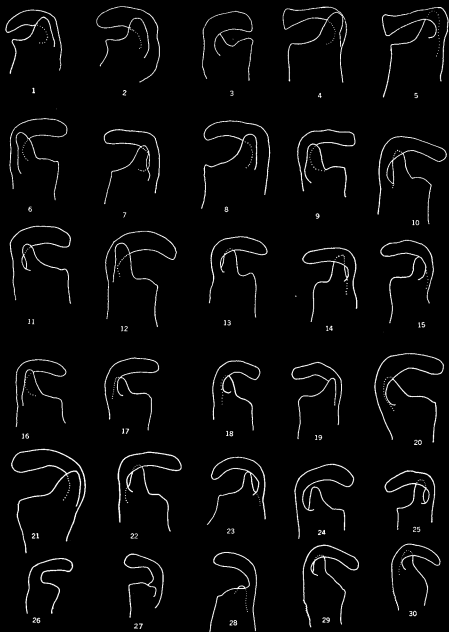
Color of body dark brown, appendages somewhat lighter. Wings hyaline, with a brownish cast; veins brown.

Male: Length 4.5–6.6 mm.

EXPLANATION OF PLATE VII

Volsellae of male genitalia of *Myrmica* species:

Fig. 1. *Myrmica laevinodis* Nylander. Fig. 2. *Myrmica laevinodis* var. *bruesi* Wheeler. Fig. 3. *Myrmica smythiesi* subsp. *dshungerica* Ruzsky. Fig. 4. *Myrmica sulcinodis* Nylander. Fig. 5. *Myrmica sulcinodis* var. *sulcinodo-scabrinodis* Forel. Fig. 6. *Myrmica scabrinodis* Nylander. Fig. 7. *Myrmica scabrinodis* subsp. *mexicana* Wheeler. Fig. 8. *Myrmica lobicornis* Nylander. Fig. 9. *Myrmica lobicornis* subsp. *fracticornis* Emery. Fig. 10. *Myrmica lobicornis* subsp. *fracticornis* Emery. Fig. 11. *Myrmica sabuleti* Meinert. Fig. 12. *Myrmica sabuleti* subsp. *americana* Weber. Fig. 13. *Myrmica sabuleti* subsp. *hamulata* Weber. Fig. 14. *Myrmica sabuleti* subsp. *hamulata* Weber. Fig. 15. *Myrmica sabuleti* subsp. *nearctica* Weber. Fig. 16. *Myrmica schencki* Emery. Fig. 17. *Myrmica schencki* subsp. *emeryana* Forel. Fig. 18. *Myrmica schencki* subsp. *emeryana* Forel. Fig. 19. *Myrmica schencki* subsp. *tahoensis* Wheeler. Fig. 20. *Myrmica brevinodis* Emery. Fig. 21. *Myrmica brevinodis* Emery subsp. *sulcinodoides* Emery. Fig. 22. *Myrmica brevinodis* subsp. *brevispinosa* Wheeler. Fig. 23. *Myrmica scabrinodis* subsp. *wesmaeli* Bondroit. Fig. 24. *Myrmica scabrinodis* (= *M. specoides* Bondroit). Fig. 25. *Myrmica scabrinodis* subsp. *rugulosoides* var. *striata* Finzi. Fig. 26. *Myrmica wheeleri* Weber. Fig. 27. *Myrmica wheeleri* Weber. Fig. 28. *Myrmica moravica* Soudek. Fig. 29. *Myrmica punctiventris* Roger. Fig. 30. *Myrmica punctiventris* subsp. *pinetorum* Wheeler.



Antennal club indistinctly 4-jointed; antennal scape equal in length to from 5-6 of the following funicular joints together; seen from a postero-dorsal view bent obtusely at the basal $\frac{1}{3}$, 0.6 as wide at the somewhat compressed base as at the distal part; joints 1-2 of the funiculus together distinctly longer than joints 3-5 together. Epinotal declivity dorsally with two obtuse tubercles. Petiole in profile distinctly higher than the exposed ventral surface is long, with plane anterior face and evenly convex postero-dorsal surfaces. Postpetiole, in profile, 0.6 as long as high, elliptical. Gaster ovate, 19-30 teeth on the sagittae, averaging 24, volsellae of genitalia as illustrated. Legs moderately long and slender.

Surface of head shining, with sparse, irregular, somewhat fine rugae or vermiculations, densely punctate at the base of the sculpturing; thorax largely smooth and shining, striate at the margins of the segments and sparsely punctate laterally; petiole shining, finely punctate and with scattered striae; postpetiole and gaster smooth and shining.

Hairs of head short, fine, subappressed and numerous; of thorax short, fine and sparse; of pedicel and gaster fine and moderately abundant; of appendages numerous, fine and unappressed. Appressed pubescence on the legs.

Color of head black; of remainder of body and appendages blackish brown; apex of gaster, antennal club and tarsal joints brown. Wings hyaline with a brownish cast; veins brown.

There is an amazing range of variation in this subspecies over North America, but with completely intermediate conditions. This variation can not be decisively correlated with ecological conditions because of the absence of other than date and locality records for many of the specimens. In general, the darkest ants come from the mountains of the West and from eastern Canada.

Type Localities: Connecticut (Pergande); New York: Buffalo (Wasmann); "Dakota."

Other Localities:

NEWFOUNDLAND: Bay of Islands (Gratacap). NOVA SCOTIA: Pleasantfield (W. H. Prest); Penobsquis, Portauipique (C. A. Frost); Port Maitland (W. Reiff); Truro (no collector); Digby (J. Russell); Yarmouth (T. D. A. Cockerell). NEW BRUNSWICK: St. Andrews (R. O. M. Z.). QUEBEC: Chelsea, Hull, Kingsmere (W. M. Wheeler). ONTARIO: East Main R., border of Ungava, James Bay (A. Skinner); Gravenhurst, Muskoka Dist., Ottawa (no collectors); Pelee Isl. (M. Talbot); Franz (N. A. Weber); Lake Couchiching, Arnprior, Lampton, Toronto, Weston (R. O. M. Z.); Manitoulin I. (C. H. Kennedy). MAINE: Kittery Point (Pergande Coll.); Old Town, Presque Isle (M. W. Wing); Ocean Point (E. & G. Wheeler); Glenmere (W. M. Wheeler); Gardiner, Salisbury Cove, Mt. Desert I. (N. A. Weber). NEW HAMPSHIRE: Errol and Swift Diamond Farm, Coos Co. (H. Shapley); Franconia (Fiske); Mt. Washington Summit (C. S. Bacon, A. T. Slosson); Contoocook (E. & G. Wheeler). VERMONT: Woodstock (N. A. Weber). MASSACHUSETTS: Woods Hole (H. Bagg, T. D. A. Cockerell, W. M. Wheeler); New Boston, Berkshire Co. (W. M. Wheeler); Milton (C. H. Blake); Truro (A. P. Morse); Middlesex Falls, Stony Brook Res., Boston, S. Wellfleet

(N. A. Weber). CONNECTICUT: Colebrook, Litchfield Hills (W. M. Wheeler); New Haven (Type Locality, T. Pergande); East Wallingford (R. F. Snodgrass). NEW YORK: Pine Island, Niagara Falls, Ithaca (no collectors); Greenville, Mosholu, Brantville (W. M. Wheeler); Fishers Isl., Flatbush, L. I. (T. Pergande); Suffern (A. T. Gaul). NEW JERSEY: So. Orange, Fort Lee, Hoboken, Arlington (no collectors); Matawan (W. M. Miller); "New Jersey" (T. Pergande). PENNSYLVANIA: St. Vincent (Schmitt); Centre Co., Spring Creek, State Coll., Penn-Roosevelt Dam, Philadelphia (W. L. Brown). DISTRICT OF COLUMBIA: Washington (T. Pergande). MARYLAND: Bladensburg (T. Pergande). WEST VIRGINIA: Terra Alta, Preston Co. (G. C. Wheeler). TENNESSEE: Smoky Mts., (A. C. Cole); Chimney Peaks, Montvale Spgs. (C. H. Kennedy). SOUTH CAROLINA: Caesar's Head (M. R. Smith). OHIO: Columbus (M. R. Smith); North Bass and Sisters Isl. (M. Talbot); Put-in-Bay, Green Isl. (C. H. Kennedy); Southcentral Reg. (L. G. & R. G. Wesson); Killdeer Plain (M. E. Amstutz). INDIANA: Plymouth (M. R. Smith); Dune Acres (D. Lowrie); Lafayette (H. O. Deay). ILLINOIS: Rockford (W. M. Wheeler); Cook Co., Chicago (H. Brun); Momence (D. Lowrie). MICHIGAN: Warrens Dunes (M. Talbot); Ann Arbor (J. Dawson); Porcupine Mts. (O. M. McCreary). WISCONSIN: Madison (A. C. Burrill); Lake Geneva, Williams Bay (Ill. Nat. Hist. Surv.); Milwaukee (Cudaby); Calhoun (no collectors). IOWA: Ames (T. Pergande); Sioux City (C. N. Ainslie).

MINNESOTA: Brainerd, Bemidji (N. A. Weber); Duluth (R. E. Gregg). NORTH DAKOTA: Mikkelsen (J. E. Goldsberry); Townier, Grassy Butte, Cannonball R., Dunseith, Anamoose, Upham, Langdon, Edmore, Stanley, Hope, Bismarck (N. A. Weber); Wildrose (no collector); Dickinson (C. N. Ainslie); Cass Co., Fabian, Fargo, Gardner (C. Schonberger); Divide Co. (J. Davis); Hettinger Co., Garrison (R. P. Uhlmann). SOUTH DAKOTA: Hill City (W. S. Creighton, Pergande Coll.); Spearfish, Kennebec (A. C. Cole). NEBRASKA: North Platte (A. C. Cole). KANSAS: Richmond (E. G. Titus). MANITOBA: Turtle Mts., Audy L., Riding Mt. Nat. Park (N. A. Weber). SASKATCHEWAN: Saskatoon (K. M. King); Gainsborough (N. A. Weber). ALBERTA: Bilby, Edmonton (G. Salt); Banff (P. Darlington, G. Salt, W. M. Wheeler); Moraine Lake, Lake Louise (W. M. Wheeler); Vermillion Pass (E. Whymper). MONTANA: Browning (W. S. Creighton). WYOMING: Yellowstone Park (A. C. Cole); U. of Wyo. Camp., 9,600 feet (T. D. A. Cockerell). IDAHO: Twin Falls, Stanley (A. C. Cole); Double Springs, Lost River Range, Gibbons Pass, Bitterroot Mts., (W. S. Creighton). COLORADO: Florissant, Colorado Springs, Cripple Creek, 10,200 ft., Buena Vista, Cheyenne Canyon, Manitou (W. M. Wheeler); Ute Pass (T. D. A. Cockerell, W. M. Wheeler); Sugar Loaf Mt., Eldora, 8,600 ft., Pikes Peak (T. D. A. Cockerell); Creede Co., 8,844 feet (S. J. Hunter); Rocky Mts., Nat. Park, 9,000 and 9,500 feet (N. A. Weber); Boulder (W. S. Creighton, P. J. Schmitt); Hartsel, Fraser, Winfield, Gransby (W. S. Creighton). UTAH: Salt Lake Co. (R. V. Chamberlin, Grundmann, Fox); Blue Mts., Mirror L., Uinta Mts., 10,000 feet, La Sal Mts., Bryce Canyon (W. S. Creighton); Alta, Camas, Wales Summit Co. (Grundmann, Rees); Neole, Duchesne Co. (Knowlton & Harmston). NEVADA: Contact (A. C. Cole). MEXICO: Beulah,

8,000 feet (T. D. A. Cockerell); James Canyon, 8,000 feet; Cox Canyon, 9,300 feet; Cloudcroft, 8-9,000 feet; Sacramento Mts., (W. M. Wheeler); Harvey's Ranch, Las Vegas Mts., 10,000 feet (E. L. Hewett); Taos (A. C. Cole). ARIZONA: Coconino Forest, Grand Canyon, Mt. Lemmon, 8-9,100 feet, Stratton, 6-7,000 feet and Bear Wallow, 8,000 feet, Santa Catalina Mts., (W. M. Wheeler); Ramsey Canyon, Huachuca Mts., 9,000 feet (W. M. Mann); Jacob's Lake, Kaibab Forest, 9,000 feet (W. S. Creighton, N. A. Weber). ALASKA: Metlahtla (T. Kincaid). BRITISH COLUMBIA: Emerald Lake (W. M. Wheeler); Carbonate and Prairie Hills, Selkirk Mts. (J. C. Bradley). OREGON: Neskowen, Mt. Hood, 6,000 feet (A. C. Cole).

The winged castes appear frequently in huge, dense swarms from late June to October. The following records are in the collection: Ontario: Aug. 9-Oct.; Quebec: Aug. 31; New Hampshire: Aug.; Massachusetts: Sept. 4; Connecticut: July 21-Aug. 29; New York: Aug. 2-Sept. 8; New Jersey: Sept. 22; Pennsylvania: Oct. 10; District of Columbia: Sept. 18-Oct. 12; Virginia: Aug. 27; Ohio: Oct. 8; Illinois: July 13-Oct. 24; Iowa: Aug.; South Dakota: July-Sept. 23; North Dakota: Aug. 19-Oct. 5; Colorado: June 26-Aug. 18; Arizona: July 24; New Mexico: July 8-14; Arizona: July 12-27; Saskatchewan: July 15; Alberta: Aug. 19; Idaho: July 3-Aug. 25; Nevada: Aug. 18; Utah: Aug. 10-14; Oregon: July 12; British Columbia: Aug. 13.

The variety *lobifrons*, which was described by Pergande in 1900 as a variety of *sabuleti*, has been synonymized after the direct comparison of the paratype referred to by Dr. Wheeler (1917 b, p. 21) with the cotype of *fracticornis*. The original description is too incomplete to be of value. The paratype is darker than the cotype of *fracticornis*, which is considered typical, but not darker than another cotype. The antennal scape has the same transverse lamina at the joint, though somewhat smaller; the epinotal spines are similar. The sculpturing is the same.

The variety *glacialis*, which was described by Forel in 1904 as a variety of *scabrinodis*, has been synonymized after the direct comparison of a cotype with the cotype of *fracticornis*. This is also darker in color but otherwise practically indistinguishable, with the same type of antennal scape, epinotal spines, sculpturing and other characters. In his original description Forel admitted its resemblance to *fracticornis* but separated it because "tous les articles du funicule sont au moins aussi longs qu'épais." I find, however, that in the cotype the joints are longer than broad, although the 3rd to 6th are quite broad, as also in *fracticornis*.

This cotype of *fracticornis* is probably one of the specimens responsible for Emery's original description of the variety as "klein, dunkel gefarbt, Fühlerschaft gekinckt, an der Basis wenig compress, ohne oder mit einem kleinen, spitzen zahn."

The study of two cotypes of *detrilinodis* and the comparison of them with cotypes of *fracticornis* and *emeryana* convinces me that they would be better considered as specimens transitional between the above mentioned forms. The antennal scape is very similar to the scape of *emeryana* in the possession of a high oblique keel along the anterior and medial side of the bend and its practical absence on the posterior side. The sculpturing, however, is that of *fracticornis*; the rugae of the medial

dorsal surface of the head are much more regular than that of *emeryana*; the dorsal longitudinal smooth area of the postpetiole is similar to that in some *fracticornis* workers and quite different from the deeply rugose surface in *emeryana*. While there are other workers resembling the cotypes of *detritinodis* to be found in colonies of the other forms it does not seem desirable to retain a separate name for these. They are, after all, only transitional between forms in a highly variable genus.

The following variations may be noted in the castes of this form:

Males with the antennal scape equal in length to the 7 following joints together.

A few dark brown workers from Terra Alta, West Virginia, have somewhat shorter antennal scapes and with the dorsal keel at the bend greatly reduced; the epinotal spines are acute and strongly diverging. The rugosity of the head is unusually regular; the sculpturing of the thorax and pedicel is remarkably open, being, on the anterior part of the thorax especially, irregularly reticulate and on the pedicel nearly absent; the base of the thoracic sculpturing is punctate, that of the pedicel faintly reticulate. The discovery of the winged castes may necessitate establishing these as a distinct form but I hesitate to describe new forms upon such limited material in this highly variable genus.

TRANSITIONS TO *M. SABULETI* SUBSP. *AMERICANA*

Workers with a wide lamina along the posterior margin of the antennal scape approaching the condition in *sabuleti* are found, but uncommonly. Among winged specimens, apparently from the same swarm, from Ontario are females of this *sabuleti* type with typical *fracticornis* females and males.

TRANSITIONS TO *M. BREVINODIS* SUBSP. *BREVISPINOSA*

The antennal scape of workers and females, which have no keel on the dorsal part and only a slight indication of a keel on the compressed basal portion closely resemble the scapes of *brevispinosa*. The epinotal spines, however, are of normal length. The most distinct of this form include a dark worker cotype of *fracticornis* from New Haven, Connecticut, three workers from Yellowstone Park, Wyoming, and three workers with a small *fracticornis* male from Mikkelsen, North Dakota. It does not seem desirable to consider them a distinct form.

ANOMALIES

An abnormal male with fused antennal joints from Cheyenne Creek, near Colorado City, Colorado, was found with normal males; on the one antenna the distal two joints were fused, on the other the distal three joints were more or less completely fused. In a collection from Kennebec, South Dakota, occur males with distinct and acute epinotal spines and males with normal, obtuse tubercles. A worker from Calhoun, Wisconsin, has asymmetrical epinotal spines, the right spine being a little shorter than normal, the left spine being hardly longer than its base is wide.

BIOLOGY

This form frequently nests under stones or wood, occasionally under grass, especially in fairly damp situations. In the mountains of the West, according to Dr. Wheeler, it nests in rocky, warm slopes on openings among the pines. In North Dakota it is found in moister and more shaded localities than is *sabuleti americana*. The brood is kept in a series of chambers scattered through the top few inches of the soil, sometimes deeper. The workers of this subspecies are timid, some becoming temporarily immobile when disturbed. In digging up a colony at Towner, North Dakota, a new species of "velvet ant" or wasp of the family Myrmosidae, which I have described as *Myrmosa dakotensis* (Weber, 1934), was obtained which may have been parasitic on the ants. A colony from the same locality was taken to the island of Cuba and flourished in an observation nest in the much hotter and more humid climate until ended over a month later. The workers reared winged females from pupae of this colony on July 7, several weeks earlier than they have been taken in North Dakota.

In the Turtle Mountains of this state, several miles from the Canadian boundary, I found a colony of *fracticornis* nesting in close proximity to one of *Leptothorax acervorum canadensis* Prov.¹ The brood of the *Leptothorax* was in a curled-up leaf under debris on top of the soil and in several shallow chambers in the soil while the *Myrmica* brood was found in slightly deeper chambers a few centimeters away. The tangle of roots and the lateness of the day prevented careful examination of the nests but some tunnels of the two species were evidently very close to each other. The ants were removed and put in an observation nest where the two species took possession of separate cells though neither was aggressively hostile to the other. The *Leptothorax*, however, died within a few days. It is possible that the relations of the two species may be similar to those found by Dr. Wheeler between *M. brevinodis* and *L. emersoni* (Wheeler, 1903, 1907).

Myrmica lobicornis subsp. *jessensis* Forel

M. lobicornis var. *jessensis* Forel, Ann. Soc. Ent. Belg., 1901, 45: 371, ♀.

Worker (after Forel):

Lobe of the antennae a little shorter than in the type, epinotal spines shorter and the petiolar node more rounded. Somewhat near the var. *schencki* Emery. Color deep as in *lobicornis* of the Alps and the North. Lobe of the antennae much more developed than in *fracticornis* Em. of the U. S.

Myrmica lobicornis var. *kieviensis* Karawajew

M. lobicornis var. *kieviensis*, Karawajew, Travaux syst. et faun., Ukrainian Acad. Sci., Kiev., 1934, p. 91, ♀.

A form from Kiev, Ukraine unknown to me.

Type Locality: Japan: Sapporo (Jesso Island).

¹Near these was a nest of *Dolichoderus* (*Hypoclinea*) *plagiatus* subsp. *pustulatus* Mayr (det. Dr. W. M. Wheeler, in *litteris*), northernmost record of this genus in North America.

***Myrmica lobicornis* subsp. *lissahorensis* Stårcke**

M. lobicornis lobicornis var. *lissahorensis* Stårcke, Tijdschr. Ent., 1927, 70: 79-80, ♀.

Lissa Hora (Besk.).

For a description of this form see the reference above.

***Myrmica lobicornis* subsp. *littoralis* Kuznetsov-Ugamskij**

M. scabrinodis lobicornis var. *littoralis* Kuznetsov-Ugamskij, "The Ants of the South Ussuri Region (In Russian)," 1928: 33-36, figs. 15-19, ♀ ♀ ♂.

Worker (after Kuznetsov-Ugamskij): Length 3.6-5.2 mm.

Antennal scape suddenly bent at the base and at the bend lightly striate longitudinally. Epinotal spines shorter than the horizontal surface of the epinotum, the space between them and strongly shining. Metasternal lobes blunt. Reddish brown, head and thorax darker.

Female (after Kuznetsov-Ugamskij): Length 5-5.7 mm.

Color of the body darker than in *M. scabrinodis lobicornis*.

Male (after Kuznetsov-Ugamskij): Length 5-5.4 mm.

Epinotum with two short, broad, pointed teeth (in the typical *lobicornis* they are blunt); the space between strongly shining, but not smooth, being microscopically sculptured. Pilosity somewhat abundant. Color of the body dark, leg joints, tarsi and distal half of the antennal funiculi reddish. (The antennal scape is equal in length to the 7 following segments according to Kuznetsov-Ugamskij's figure).

Type Localities: South Ussuri Region: Okeanskaja, Bassargin, Tigrovaja, Ussuri Station.

***Myrmica lobicornis* subsp. *lobulicornis* Nylander**

M. lobicornis var. *lobulicornis* Nylander, Bull. Soc. Ent. France, 1856: LXXIX, ♀.

Worker (after Nylander):

In this subspecies the lobe at the base of the scape is smaller and less dilated than in the typical form of the species.

Type Locality: France: Mt. Dore.

Nylander described this subspecies from one worker and nothing more is known of its characteristics. Finzi (1926, p. 107) described a worker from England which he believes may possibly be ascribed to it.

***Myrmica lobicornis* subsp. *pyrenaea* Bondroit**

M. arduennae var. *pyrenaea* Bondroit, Ann. Soc. Ent. Belg., 1918, 55: 106, fig. 53, ♀.

M. lobicornis var. *pyrenaea*, Finzi, Boll. Soc. Adr. Nat., Trisete, 1926, 39: 108, ♀; Santschi, Rev. Suisse Zool., 1931, 38: 350, ♀.

For descriptions of this form see the references above.

***Myrmica puerilis* Stårcke**

Myrmica puerilis Stårcke, Nederl. Ent. Ver., 12 Oct. 1942, p. XXVII, ♀ ♀ ♂.

M. scabrinodis var. *atlantica* Stårcke, *ibid.*

M. neglecta Stårcke, *ibid.*

A form from the Netherlands unknown to me.

***Myrmica sabuleti* Meinert**

M. sabuleti Meinert, Kong. Danske. Vidensk. Selsk. Skrift., 1861, 5: 327, ♀ ♂.
M. scabrinodis var. *bessarabica* Nasonov, Arb. Lab. Zool. Mus. Moscow Univ.
(In Russian), 1889, 4: 36, ♀.

Worker (after Donisthorpe): Long $2\frac{1}{4}$ lin.

Reddish yellow; gaster darker above. Antennal scape bent almost at right angles, base with a tooth, and on the upper side with a high sharp longitudinal keel. Frontal flaps large, ear-shaped. Frontal portion wholly or partly wrinkled. Sides of head irregularly, thorax and nodes of pedicel distinctly wrinkled longitudinally.

Female: Emery states that it is not possible to distinguish the ♂ and ♀ from those of *scabrinodis*.

Male (after Donisthorpe): Length $2\frac{1}{2}$ – $2\frac{3}{4}$ lin.

Black; antennae for the great part, apex of gaster, joints of legs and feet yellow. Antennal scape a third of the length of the funiculus, the last joint longer than the two preceding ones together, often bent or divided in the middle. Antennae almost bare; legs with long, oblique, sub-erect hairs. First node of pedicel wrinkled longitudinally. Wing greyish brown to beyond middle.

Emery (1908, p. 177) believed that *sabuleti* might possibly be identical with the winged pair of ants described by Nylander as *M. granulinosus*.

Distribution: Europe, Central Asia.

***Myrmica sabuleti* subsp. *americana* Weber**

M. sabuleti subsp. *americana* Weber, Lloydia (Lloyd Library, Cincinnati, Ohio), 1939, 2: 144–146, ♀ ♂.

M. sabuleti of authors.

M. sabuleti subsp. *trilicornis* Buren, Iowa State Coll. Jour. Sci. 18: 281–283, ♀ ♀.

Worker: Length 4.5–6.2 mm.

Antennal scape exceeding posterior margin of head by a distance equal to its distal diameter; seen from above, with nearly straight lower margin and slightly sigmoid upper margin, bent distinctly at the distal end, which is about one-third larger in diameter than the proximal end, equipped at the bend with a nearly vertical, high lamina which is prolonged a trifle along the sides; lamina, viewed posteriorly, in the form of an acute tooth; bend at right angles to the scape; joints 1 and 2 of the funiculus together distinctly longer than 3–5 together. Thorax, in profile, slightly convex, with distinct and rounded mesoepinotal suture; epinotal spines, from the side, distinctly longer than the declivity ventral to them, projected upwards and backwards at about a 55° angle; seen from above, moderately diverging, about one-half longer than the distance between their bases. Petiole, in profile, with concave anterior face meeting the dorsal convex surface at a rounded angle, as long from apex of ventral tooth to postpetiole as it is high; postpetiole, in profile, with nearly plane ventral surface and convex dorsum, as high as long. Gaster ovate. Legs of moderate length.

Surface of head regularly and moderately sculptured; frontal area distinct, finely striate-punctate; clypeus with 10–14 rugae; median dorsal region with regular, comparatively close-set, rugae which diverge

to the posterior angles; posterior surface reticulate, lateral surfaces rugose-reticulate. Thorax coarsely and sharply rugose, slightly vermiculate dorsally. Petiole dorsally with deep, irregular, vermiculations, laterally deeply and more regularly rugose; postpetiole rugose, dorsally somewhat concentrically rugose. Surfaces of body, except gaster, punctate at the base of the sculpturing. Gaster smooth and shining.

Pilosity moderate, hairs coarse, truncate or acute; appendages with moderately coarse, subappressed hairs; no pubescence on legs.

Color of head brown, of thorax and appendages ferruginous, gaster dark brown, lighter apically.

Female: Length 5.2-7 mm.

Similar to the worker and with equally high keel on the antennal scape, which is prolonged slightly more on the posterior side.

Differing in the following: Epinotae, spines shorter than the declivity ventral to them, stout and bluntly tipped. Petiole, in profile, with faintly concave anterior face, slightly longer from apex of ventral tooth to postpetiole than it is high. Postpetiole with plane ventral and convex dorsal surface, distinctly higher than long.

Sculpturing of the head less regular. Pronotum at the sides deeply vermiculate-rugose, reticulate only at the very anterior margin; posterior sides of thorax evenly rugose; scutum of mesonotum with elongate anteromedian smooth area from which radiate fairly even rugosities, somewhat vermiculate on the sides. Pedicel deeply sculptured as in the worker.

Pilosity moderately abundant, partly truncate, partly acute; legs with appressed hairs but without pubescence.

Color of head ferruginous, brownish mid-dorsally; thorax ferruginous with two elongate parapsidal brown blotches on the mesonotum; remainder of body and appendages ferruginous, gaster with a brown transverse, medial band. Wings hyaline with a brownish cast; veins brown.

Male: Length 5.2-6.6 mm.

Antennal scape subcylindrical, somewhat larger in diameter distally, evenly bent at a slight angle at the basal $\frac{1}{4}$, equal in length to from 4-5 of the following segments together; funicular club indistinctly 4-5-jointed. Epinotal declivity armed dorsally with two distinct subacute or rounded tubercles. Petiole, in profile, with plane anterior face and convex dorsal surface; postpetiole, in profile, one-fourth higher than the petiole, dorsal surface convex, ventral surface nearly plane to slightly convex. Sagittae of the genitalia with 25-31 serrations; volsellae as illustrated.

Surface of head shining, with comparatively numerous rugae, punctate at the base of the sculpturing; thorax shining, abundantly rugose-striate except on the largely smooth scutum of the mesonotum, punctate at the base of the sculpturing; petiole thinly but distinctly rugose, finely punctate basally; postpetiole and gaster smooth and shining.

Pilosity moderately abundant, acute, fine. Appressed pubescence on the antennae and legs.

Color of head blackish brown, remainder of body and appendages dark brown, pedicel and base of gaster, antennal club and tarsi lighter brown. Wings hyaline with a brownish cast; veins brown.

Type Locality: Colebrook, Connecticut, Aug. 16, 24, 1904 (W. M. Wheeler).

Other Localities: QUEBEC: Hull, Kingsmere (W. M. Wheeler); Renfrew (M. Stewart). ONTARIO: Toronto (A. J. Crew, M. Sewell); Renfrew (M. Stewart); Ottawa (no collector); Pelee Is. (M. Talbot); Kingston (A. B. Klugh). MAINE: So. Harpswell, Casco Bay, Sebastegegan Is. (W. M. Wheeler); Kittery Point (Pergande Coll.); Old Town (M. W. Wing). NEW HAMPSHIRE: Mt. Washington (no collector); Durham (Fiske). MASSACHUSETTS: Woods Hole (N. Bagg, K. W. Cooper, A. H. Sturtevant, N. A. Weber); Cuttyhunk (Cockerell); Readville (J. H. E.); Forest Hills, Blue Hills (N. A. Weber, W. M. Wheeler); Newton, Falmouth (A. H. Sturtevant, K. W. Cooper, N. A. Weber); Wellesley (A. P. Morse); New Boston, Berkshire Co. (W. M. Wheeler); Lawrence (U. S. N. M.); Nantucket Is. (Pergande Coll.); Plum Is., Newbury (S. K. Harris); Yarmouth Port (H. Shapley). CONNECTICUT: Colebrook (W. M. Wheeler); New Haven (B. H. Walden); E. Wallingford (R. E. Snodgrass); Devon (N. A. Weber). RHODE ISLAND: E. Greenwich (N. A. Weber). NEW YORK: Carmel, North Castle, Ramapo, Greenville, Hollow, L. I., Ashokan Surv., Moshulu, Bronxville (W. M. Wheeler); Rochester (A. B. Klots); West Farms, New York City (J. Angus); Tuckahoe (no collector); Schenectady (C. F. Turner); Syracuse (E. & G. Wheeler); Fisher's Is., L. I. (U. S. N. M.); Staten I., Croton (A. T. Gaul). NEW JERSEY: Newfoundland (W. M. Wheeler); So. Orange, Fort Lee (no collector); Normandy B. (W. P. Horen); Watchung Mts. nr. Westfield (C. R. Mekeel, N. A. Weber); Caldwell, Camden Co. (U. S. N. M.). PENNSYLVANIA: Rockville, Philadelphia (W. L. Brown); Beatty (U. S. N. M.); Swarthmore Coll., Towanda (N. A. Weber). DISTRICT OF COLUMBIA: Washington (T. Pergande). VIRGINIA: Wallops I. (W. L. McAtee); "Eastern Shore" (U. S. N. M.). TENNESSEE: Cold Spring Mt. (C. A. Dennis). OHIO: North Bass I., So. Bass I. (M. Talbot); Southcentral Region (L. G. & R. G. Wesson); Kildeer Plain (M. E. Amstutz). MICHIGAN: Lansing (A. C. Cole); Mich. Biol. Sta., Flat Rock (M. Talbot). INDIANA: Tremont, Chesterton (R. E. Gregg); Plymouth (M. R. Smith); Lake Co. (Blatchley); Lafayette (H. O. Deay). ILLINOIS: Champaign (Hart, Weed, A. O. Weese); Billets Sta. (Forbes); Urbana (A. Duke, Hart, Hunt, Martin, McElfresh, Shaml, Terrill, Weed, J. Zetek); Bradford (Kelly); Beach (Frison, Knight, Ross); Cedar Lake, Normal, Galesburg, Centralia, Cuba, Chicago, Bloomington, Quincy (Ill. Nat. Hist. Surv.); Algonquin (W. A. Nason); Hickory Creek, Zion (M. Talbot); Rockford (W. M. Wheeler); Waukegan, La Salle, Momence (R. E. Gregg, D. Lowrie). WISCONSIN: Milwaukee (C. E. Brown); Reedsburg, Madison, Delaven (A. C. Burrill). IOWA: Sioux City (C. N. Ainslie); Ames (W. F. Buren, Pergande Coll.); Boone, Clinton, Keokuk, Jewell, Oak Grove St. Pk., Granite (W. F. Buren). MINNESOTA: North Branch (W. E. Hoffmann); Birchcliff, Lake St. Croix (A. Johnson, N. A. Weber); Park Rapids (N. A. Weber); Duluth (Freeman, Roine, Gregg); Saganaga L. (R. E. Gregg). MANITOBA: Wawanesa, Sidney (N. A. Weber); Auverne (N. Criddle). NORTH DAKOTA: Mikkelson (J. E. Goldsberry); Badlands near Grassy Butte, Stanton, Mercer, Towner, Denbigh, Sterling, Leeds, Rugby, Velva,

Devils Lake, Bismarck, Valley City, Hebron, Belden, Watford City, N. Roosevelt State Park, Kathryn, Pillsbury, Jct. St. Highways 46 and 1 (La. Moure Co.) (N. A. Weber); Arvilla, Grand Forks (N. A. Weber, E. & G. Wheeler); Medora, Black and Sentinel Buttes, Killdeer Mts., Glen Ullin, (E. & G. Wheeler); Binford (M. A. Hetland); Coleharbor (H. S. Telford, J. A. Munro). SOUTH DAKOTA: Capa (H. C. Severin). NEBRASKA: "Nebraska" (Pergande Coll.). KANSAS: Topeka (E. G. Titus); Osage City (A. C. Burrill). MONTANA: Helena (W. M. Mann). COLORADO: Colorado Springs, Manitou, Ute Pass, Florissant (W. M. Wheeler); Hartsel, Winfield, Granby (W. S. Creighton); Ouray (U. S. N. M.); Boulder (H. Andrews, W. P. Cockerell, W. S. Creighton, W. M. Wheeler); Roan Mts. (Cockerell); Cebolla (N. A. Weber); White Rocks, Boulder, 5,300 feet (L. F. Byers). IDAHO: Koscov (J. M. Aldrich). UTAH: Park City (U. S. N. M.); Bryce Canyon, Zion Canyon (N. A. Weber). NEW MEXICO: Pecos (Cockerell).

The winged castes appear from July to October (Massachusetts: Sept. 24; Connecticut: Aug. 14-24; Illinois: July 13-Oct. 24; Pennsylvania: Oct. 12; North Dakota: Aug. 16-Sept. 11; Colorado: July 9-Aug. 10; Utah: July 26; Arizona: July 28). From a single swarm of winged ants in North Dakota I took both sexes of *americana*, a female of *M. brevinodis* subsp. *brevispinosa* and both sexes of *Lasius niger* subspecies.

Many workers of this subspecies and *fracticornis* Emery can not be separated satisfactorily without the additional evidence of the males. The higher keel or lamina of the scape and its prolongation distally, with the comparatively flat ventral surface of the postpetiole, readily separates most of the *americana* workers from the corresponding slight transverse keel and convex ventral postpetiolar surface in worker *fracticornis*; there are specimens, however, which combine a high keel on the scape with a distinctly convex postpetiole, or a slight keel with a nearly flat ventral surface of the postpetiole. These may be considered transitional in the absence of the males and a possible instance of hybridization.

The worker is readily separated from the worker of the subspecies *nearctica* by the short posterior extension of the keel on the scape and the higher and thinner transverse portion; the ventral surface of the postpetiole is also nearly plane instead of distinctly convex. The males can be readily separated from those of *nearctica* by the longer antennal scape and distinct epinotal tubercles.

BIOLOGY

This subspecies on the whole, is larger, paler and an inhabitant of warmer and dryer situations than either of the subspecies *nearctica* or *fracticornis*.

The nests of *americana* are found under logs or stones and frequently in open situations under grass. The sites are commonly in sunny, dry localities. In North Dakota I have frequently found nests on the open prairie with the nest opening protected by a rather compact collar or slight mound of small pieces of dried plants, such as grass. This collar must protect the opening from being filled by wind-blown sand. Karawajew, at Kiev, U. S. S. R., observed colonies of *M. rugulosa* subsp.

constricta surrounding the nest opening with a similar collar of grass stems. In the valley of the Missouri River in North Dakota, the nests may be found under sandstone slabs on exposed slopes. An unusual nesting site in North Dakota was under an abandoned horse collar on the prairie, illustrating the frequently observed habit of ants in this region of protecting the nest opening. This may tend to hide the nest from predators or to reduce the extremely high moisture evaporation rate from the nest.

A prairie colony with worker brood was taken from North Dakota to the Island of Cuba and kept for over a month at the height of summer with entire success. Many workers were reared in a much hotter and more humid climate than the colony would encounter in North Dakota.

Predators of this subspecies observed at Towner, North Dakota, include the catbird, *Dumetella carolinensis* (L.), feeding on the workers, and thatching ants, *Formica rufa obscuripes* Forel, carrying dead males into their nest (Weber, 1935). The horned lizard, *Phrynosoma brevirostre* (Girard) from Grassy Butte, N. D., fed on *americana* workers at Towner.

Other ants inhabiting the same ecological formation at Towner include *Monomorium minutum minimum* Buckley; *Polyergus rufescens breviceps* Em. with its slave, *Formica fusca subsericea* Say.; *Formica sanguinea aservea* Forel with its slave, *F. fusca subsericea*; and *F. neogagates* Em.

This form is economically somewhat important. I have before me workers which were taken in Illinois attending corn root aphids and others which were reported attending aerial corn "lice." Still others from Illinois were found eating grains of a fallen corn ear and in the vial which was sent to me are several grains with the embryo and a large part of the starch inside the seed coat eaten away. Another collection from Illinois is of workers which were reported as "eating apple fruit." A number of Illinois collections are variously listed as "from volunteer wheat," "from timothy meadow," "in wheat field," "from English Elm," "from corn field," and "attacking sprouting corn." One Illinois record is of the workers eating a carabid larva. In North Dakota I have frequently taken them on the dry short-grass prairie where other insects must be the usual food. In Massachusetts workers of a populous colony on the margin of a road in woods were seen to bring to the inconspicuous nest opening under a bunch of grass a number of insects within a short time. The workers dragged two live beetle larvae and a live *Lasius niger americanus* worker to the nest. Two dealated *Myrmica americana* females with the worker size gasters wandered aimlessly about the opening; the time of year was late May so they must have wintered in the nest, as must have also two additional females dug up with the colony.

ANOMALY

The dealated *Myrmica* queen described and illustrated by Creighton (1928) belongs to this subspecies. "The thorax is joined directly to the gaster, the two petiolar joints having fused with the anterior face of the first gastric segment."

Myrmica sabuleti subsp. *hamulata* Weber

M. sabuleti Meinert ssp. *hamulata* Weber, Lloydia (Lloyd Library, Cincinnati, Ohio), 2: 146-148, ♀ ♀ ♂.

Worker: Length 3.9-5.2 mm.

Antennal scape, from above, extending barely to the occipital margins, with feebly sigmoid anterior and more sigmoid posterior margin, produced in a distinct bend outwardly at the distal end and inwardly, or medially, at the proximal end; this end with a conspicuous high, thin, lamina extending completely around it and produced proximally in an acute hook; seen from above with a right-angled proximal bend from which the lamina projects medially as a large, acute tooth; antennal club quite distinctly 3-jointed, last segment nearly as long as the two preceding together. Thorax, in profile, convex, with a shallow, obtuse mesoepinotal suture; epinotal spines, in profile, extending upwards and backwards at a 45 degree angle, longer than the declivity ventral to them, slender, acutely pointed; from above, moderately diverging, about $1\frac{2}{3}$ longer than the distance between their bases. Petiole, in profile, with anterior face barely concave, meeting the dorsal surface at about a 100 degree rounded angle, a little higher than the distance between the apex of the ventral tooth and the postpetiole; postpetiole, in profile, with convex dorsal and ventral surfaces, about two-thirds as long as high. Gaster ovate. Legs of moderate length.

Surface of the head rather deeply sculptured, several mid-dorsal rugae bounded by vermiculations, becoming reticulate on the sides and posterior surface. Surface of the thorax deeply vermiculate longitudinally, sides more rugose. Petiole deeply vermiculate; postpetiole more rugose, with a narrow mid-dorsal longitudinal band of fused rugae. Gaster smooth and shining. Base of the sculpturing not distinctly punctate.

Pilosity moderately abundant, dorsal hairs mostly truncate; subappressed hairs on the legs; no pubescence.

Color of body dark brown with head and gaster nearly black; appendages brown; hairs bright yellow.

Female: Length 4.9-5.7 mm.

Similar to the worker, with the following differences: Lamina of the antennal scape more erected medially and the hook projected somewhat downward. Epinotal spines shorter than the declivity ventral to them, bluntly tipped. Anteromedian triangular area of the scutum of the mesonotum smooth and shining, from which extend several rugae posteriorly and a moderate number of lateral rounded vermiculations.

Color largely dark brown dorsally and more ferruginous on the sides and appendages. Wings hyaline; veins pale brown.

Male: Length 4.2-5 mm.

Antennal scape equal in length to from 2-3 of the following joints together, bent at the basal $\frac{1}{4}$ and incrassate immediately distal to the bend; funicular club indistinctly 5-jointed. Epinotal declivity with two distinct dorsal tubercles. Petiole, in profile, with dorsal surface convex, as long from apex of the slight ventral tooth to postpetiole as it is high; postpetiole nearly $1\frac{1}{2}$ times as high as long, dorsally and ventrally convex. Sagittae of the genitalia with 19-22 serrations, volsellae as illustrated.

Sculpturing of head sparsely and feebly rugose, densely punctate. Dorsal surface of thorax shining, sparsely and feebly rugose, sides more coarsely rugose and punctate. Petiole punctate, with a few feeble rugae; postpetiole and gaster smooth and shining.

Pilosity moderately abundant, acute and fine, subappressed on the appendages.

Color moderately dark brown, head and gaster somewhat darker; wings hyaline, veins pale brown.

Described from a colony of all castes taken by Dr. W. M. Wheeler at Hayne's Canyon, 8,000 feet, Sacramento Mts., New Mexico, July 3, 1917.

This extreme form of *sabuleti* may be separated readily from the subspecies *nearctica* and *americana* by the shorter antennal scape in the male and, in the workers and females, by the unusual prolongation of the lamina of the scape into a hook on the posterior surface.

Myrmica sabuleti subsp. *lonae* Finzi

M. scabrinodis subsp. *lonae* Finzi, Boll. Sc. Adr. Sc. Nat., Trieste, 1926, 29: 103-104, fig. 11, ♀ ♂.

M. scabrinodis var. *lonae* Karawajew, Mem. Acad. Sc. Ukraine, 1929, 13: 207-208.

M. sabuleti st. *lonae*, Santschi, Rev. Suisse Zool., 1931, 38: 346-347.

For descriptions of this form see the references above. Judging from a worker sent me it seems to be a *sabuleti* form with an exaggerated development of the keel on the antennal scape.

Myrmica sabuleti subsp. *nearctica* Weber

M. sabuleti ssp. *nearctica* Weber, Lloydia (Lloyd Library, Cincinnati, Ohio), 1939, 2: 148-149, ♀ ♂.

Worker: Length 3.4-4.4 mm.

Frontal carina comparatively large, auriculate and erect. Antennal scapes barely exceeding posterior margin of head; seen from above, straight, subcylindrical, bent slightly outwards distally; with a thickened, subopaque lamina extending the entire distance around the bend and along the posterior margin fully a third the length of the scape, the lamina slightly raised at the bend but horizontal along the posterior margin and even with the top of the scape, the scape at the bend thickened in diameter and slightly produced at the posterior side; scape, from a posterior view, much thickened at the bend, which is nearly right-angled, narrow and compressed distal to the bend, normally shaped at the distal $\frac{2}{3}$; joints 1 and 2 of the funiculus together about one-fifth shorter than joints 3-5 together. Thorax, in profile, convex, evenly and distinctly impressed at the mesoepinotal suture; epinotal spines, in profile, slender, acute, with apices upturned, directed upwards and backwards at a 55-65 degree angle, a little shorter than the declivity ventral to them; from above, slightly longer than the distance between their bases, widely diverging. Petiole, in profile, with slightly concave anterior face meeting the nearly flat dorsal surface at a rounded right angle, about as long from apex of ventral tooth to postpetiole as it is high; postpetiole, in profile, with distinctly convex ventral surface, produced anteriorly, and convex dorsal surface produced posteriorly;

nearly twice as high as long. Gaster ovate. Legs moderately long and slender.

Surface of head largely reticulate-vermiculate, with few longitudinal rugae on the mid-dorsal surface; frontal area distinct, smooth and shining except for sparse punctures. Dorsal surface of thorax coarsely reticulate-vermiculate, mostly reticulate, sides coarsely rugose, vermiculate anteriorly. Petiole moderately vermiculate dorsally, more regularly rugose laterally; postpetiole shallowly rugose, smooth and shining on a mid-dorsal longitudinal area. Base of sculpturing on body, except on gaster, abundantly punctate. Gaster smooth and shining.

Pilosity moderate, comparatively fine, hairs truncate or acute; legs with subappressed hairs; no pubescence.

Color of head from ferruginous to dark brown, thorax also variable but lighter, gaster dark brown, appendages ferruginous to brown.

Female: Length 5-5.7 mm.

Similar to the worker, with the following differences: Antennal lamina, especially at the bend, somewhat raised. Epinotal spines a little shorter and blunter, pointed downwards slightly.

Sculpture of head more regularly rugose. Sides of thorax rugose, anterior margin of pronotum vermiculate-reticulate; scutum of mesonotum with an anterior triangular smooth area, posteriorly followed by several rugae and, laterally, by rounded, open vermiculations. Pedicel deeply rugose, more vermiculate dorsally.

Pilosity moderately abundant, finer and subappressed on the gaster; subappressed hairs on the legs; no pubescence.

Color of head ferruginous, infuscated dorsally; thorax lighter ferruginous, mesonotum with distinct anteromedian and parapsidal brown blotches, several median blotches on the sides; pedicel and appendages light ferruginous; gaster dark brown, wings hyaline; veins light brown.

Male: Length 4.3-4.7 mm.

Antennal scape subcylindrical, slightly incrassate towards the middle, $2\frac{1}{2}$ times as long as wide, shorter than the 3 following segments of the funiculus together; antennal club 4-jointed; epinotal declivity armed dorsally with two low and indistinct tubercles. Petiole a little longer from apex of ventral tooth to postpetiole than it is high, evenly convex above; postpetiole $1\frac{1}{2}$ times as high as long, convex dorsally, less convex ventrally, slightly higher than the petiole. Sagittae of the genitalia with 21-24 teeth; volsellae as illustrated. Gaster ovate. Legs moderately long and slender.

Surface of head somewhat shining, thickly punctate, with sparse, low, rugae. Scutum of mesonotum mostly smooth and shining; sides thickly punctate, margins sparsely rugose; petiole finely punctate; postpetiole and gaster smooth and shining.

Pilosity moderate, erect, coarse, and truncate on the head, thorax and appendages, otherwise largely fine and acute; no pubescence.

Color brown, dark brown on the head. Wings hyaline; veins whitish to brown.

Described from colonies taken by myself 14 miles southwest of Townier, North Dakota, June 5, 1932 (type colony and locality) and at Wawanesa, Manitoba, July 2, 1933. Syntype colonies were taken by

W. M. Wheeler at Cheyenne Canyon and Buena Vista, Colorado. My colonies were both in the woods along the Souris or Mouse River, which drains eventually to Hudson's Bay. The North Dakota colony was discovered on the north and cold slope of a densely wooded ravine (*Populus tremuloides* Michx.) and the nest was in the form of anastomosing chambers under moss. Sept. 5, 1937, the exact site of the Dakota collection was revisited and a small colony was found. The same type of nest was present and the workers became temporarily immobile ("feigned death") when disturbed. Other colonies were found 5 miles north and 6 miles south of Towner. All nests were in wooded areas and the colonies were small.

This subspecies closely resembles the European form; it can be distinguished readily from *americana* by the shorter male antennal scape and the greater development of the lamina on the worker scape.

Other localities: NORTH DAKOTA: Mikkelson (J. E. Goldsberry); Arvilla, Killdeer Mts. (N. A. Weber, E. & G. Wheeler); Grand Forks (L. Monda, N. A. Weber); Grafton, Breien, junction of Cannonball and Missouri Rivers (N. A. Weber). MICHIGAN: Marquette (O. G. Libby), ♂♂ and ♀♀ Aug. 22.

Myrmica sabuleti var. *pilosiscapus* Bondroit

M. pilosiscapus Bondroit, Ann. Soc. Ent. France, 1919: 301, ♀ ♀ ♂.

M. scabrinodis var. *pilosiscapus* Finzi, Boll. Soc. Adr. Sc. Nat., Trieste, 1926, 29: 102, fig. 10; Santschi, Rev. Suisse Zool., 1931, 38: 343.

Localities: Doubs, Arosa, ca. 1,900 m. and Graubunden (Finzi).

For descriptions of this form see the references above.

Myrmica sabuleti subsp. *scabrinodo-lobicornis* Forel

M. rubra var. *scabrinodo-lobicornis* Forel, Fourmis Suisse, 1874: 77, ♀.

M. sabuleti st. *lonae* var. *scabrinodo-lobicornis* Santschi, Rev. Suisse Zool., 1931, 38: 347.

This form, which Forel erected as a transition between *scabrinodis* and *lobicornis*, I place here following Santschi who states that he has a good series of it.

Myrmica sabuleti var. *spinosior* Santschi

M. sabuleti var. *spinosior* Santschi, Rev. Suisse Zool., 1931, 38: 346, ♀ ♀ ♂.

Type Localities: Eastern Pyrenees; Irun; Corse, Poggiolo; Spain; Italy. Type ♂ from Castelnovo, Venetia.

For a description of this form see the reference above.

Myrmica schencki Emery

M. scabrinodis schencki Emery, Zool. Jahrb. Syst., 1895, 8: 315, ♀ ♀ ♂.

M. schencki Finzi, Boll. Soc. Adr. Sc. Nat., 1926, 29: 109-111, fig. 14; Santschi, Rev. Suisse Zool., 1931, 38: 351.

Worker (after Emery, 1908): Length 4-5 mm.

Dark colored, brownish red, head and gaster brown to blackish brown. Sculpturing strong, somewhat as *scabrinodis scabrinodis*, on

the postpetiole finer and weaker. Scape at the bend with a strong, broad transverse lobe, similar in that to *lobicornis*, from the latter form differing in the shape of the petiole, whose node, in profile has not anterodorsally such a clear angle; in this condition *schencki* is intermediate between *scabrinodis* and *lobicornis*. Epinotal spines long as in *scabrinodis*, the infraspinal surface as a rule smooth.

Female (after Emery, 1908): Length 5-6 mm.

Differing from *scabrinodis* and *lobicornis* in the same manner as the worker.

Male (after Emery):

Specimens, which have not been found with workers or females, cannot be distinguished from *scabrinodis scabrinodis*.

Distribution: Middle Europe to Manchuria and China.

Myrmica schencki var. *brunescens* Karawajew

M. schencki var. *brunescens* Karawajew, Acad. Sc. Ukraine, 1929, 13: 208, ♀.

M. lobicornis var. *brunescens* Santschi, Rev. Suisse Zool., 1931, 38: 350-351, ♀.

Worker (after Karawajew):

Head thicker and with finer longitudinal sculpturing than in the type, with sharper ventral sculpturing and therefore little shining. Thorax irregularly and less deeply longitudinally wrinkled, especially at the sides. Pedicel more coarsely and irregularly, especially on the petiolar node, rugose longitudinally.

Head and gaster very dark brown, thorax, pedicel and appendages reddish.

Type Locality: North slope of the Caucasus: Teberda, Karatschai-Kreis, 20-25.VII.1927 (Karawajew).

Myrmica schencki subsp. *burtshak-abramovitschi* Karawajew

M. schencki var. *burtshak-abramovitschi* Karawajew, Acad. Sc. Ukraine, 1929, 13: 209, fig. 4, ♀.

M. lobicornis st. *burtshak-abramovitschi* Santschi, Rev. Suisse Zool., 1931, 38: 351, ♀.

Worker (after Karawajew): Length 3.5-4.5 mm.

Head and frons as in the type, yet the lobe of the scape is extraordinarily strongly developed, the basal part of the scape also being very massive. The top of the scape at the bend is, in surface view, biscuit-shaped, even, from which the outer part of the lobe is broadly rounded. Epinotal spines long and thin, at the base, however, somewhat thick. The petiole is very short and the anterior edge projects as in *lobicornis*.

The middle of the head is sharply but not deeply sculptured longitudinally, not thickly so that in the posterior section of the frons about 10-15 ridges are present.

Frontal area finely striate but not shining. Thorax very coarsely rugose longitudinally, about 4 rugosities dorsally; the postpetiole is hardly less coarsely sculptured than the petiole.

Very dark brown colored, the gaster (at the apex?) reddish yellow.

"Because of the constriction of the frons I place this variety with *schencki* and not with *lobicornis*. As well as I can judge from Finzi's description this variety comes nearest to var. *obscura* Finzi."

Type Localities: Region of the "Wilden Sees" (Dikoje Osero), Korostenj-Distr., Wollhynien, 28.VII.1927 (N. Burtshak-Abramovitsch).

"Nest under a piece of Oligocene sandstone. The region is mountainous, forested and with dense *azalea pontica* vegetation."

***Myrmica schencki* var. *causicola* Arnoldi**

M. schencki nat. *causicola* Arnoldi, Folia Zool. et Hydrobiol. (Riga), 1934, 6(2): 172, ♀ ♂.

A form from the Caucasus in Asia unknown to me.

***Myrmica schencki* subsp. *emeryana* Forel**

M. scabrinodis schencki var. *emeryana* Forel, Deutsche Ent. Zeitschr., 1914: 617, ♀.
M. scabrinodis schencki var. *monticola* Wheeler, Proc. Amer. Acad. Arts. Sc., 1917, 52: 505-506, ♀ ♂.

M. schencki subsp. *latifrons* Störcke, Tijdschr. Ent., 1927, 70: 84, ♀.
M. schencki of authors.

The following descriptions are drawn from two worker cotypes and from the castes of a single colony from Rockford, Illinois.

Worker (Cotypes). Length 4.5-4.7 mm.

Antennal scapes exceeding posterior margin of head by a distance about equal to their distal diameter; seen from above, in the form of a drawn-out sigmoid curve with the distal end bent outwards and the proximal end, with the lamina, appearing nearly straight; distal diameter nearly twice that of the proximal end; seen from behind it is similarly curved, with the proximal part flaring out into a triangular end and attached at the lowest angle; with a conspicuous lamina, which seen from behind, projects as an apron from the medial side and the dorso-medial angle, being rounded into the dorsal surface; seen from above the lamina is produced over the end of the scape and along the anterior, but not the posterior, side. Thorax, in profile, evenly convex to the deep and obtuse mesoepinotal suture; epinotal spines, in profile, about as long as the declivity ventral to them, directed upwards at an angle of about 45 degrees backwards, acute and with the points upturned; from above, about $1\frac{1}{2}$ times as long as the distance between their bases, diverging. Petiole, in profile, with distinctly concave anterior face forming a right angle with the slightly convex dorsal surface, one-half as long from apex of ventral tooth to postpetiole as high; postpetiole two-thirds as long as high, dorsal surface convex, ventral surface asymmetrically convex, being produced anteriorly. Gaster ovate. Legs of moderate length.

Surface of head rather coarsely sculptured; several irregular rugosities on the dorsal median surface, laterally and posteriorly becoming vermiculate-reticulate, frontal area clearly indicated but completely striate. Dorsal surface of the thorax deeply and longitudinally vermiculate, sides more regularly, but deeply rugose. Petiole deeply and irregularly vermiculate; postpetiole deeply and longitudinally rugose, somewhat fused mid-dorsally. Base of the sculpturing punctate, especially on the head and pedicel. Gaster shining, faintly reticulate.

Hairs moderately abundant and coarse, mostly truncate. Hairs of the appendages more numerous, subappressed.

Color of head dark ferruginous with a brown dorsal blotch; thorax and pedicel ferruginous, appendages lighter; gaster dark brown with lighter apex.

Worker (Illinois Specimens). Length 3.9-5.2 mm.

The lamina on the scape of some is reduced to a lower keel; joints 1 and 2 of the funiculus together are distinctly longer than joints 3-5 together. The epinotal spines may be slightly shorter than the declivity ventral to them, though longer than those of *fratricornis* and distinctly upturned. The median dorsal surface of the head in some is more regularly rugose, though in a narrower area than in *fratricornis*. Hairs of the body may be mostly acute.

Female: Length 5.1-6.3 mm.

Similar to the worker with the usual sexual differences, including the following: Epinotal spines shorter and stouter, in some not curved upwards at the tips. Sides of the pronotum deeply reticulate, sides posteriorly more regularly rugose; antero-median triangular area of the mesonotum smooth and shining, from which radiate posteriorly 4-6 rounded rugae and, laterally, rounded and open vermiculations. Pedicel deeply sculptured, dorsal surface of the postpetiole somewhat concentrically rugose.

Hairs more numerous and acute.

Color of head brown; of thorax ferruginous with a median and parapsidal brown blotches on the mesonotum; a similar blotch on the mesothoracic episternite; gaster brown with lighter base; appendages ferruginous. Wings hyaline with a brownish cast; veins brown.

Male: Length 4.6-5.6 mm.

Antennal scape subcylindrical, slightly bent at the base, one-third as wide as long, equal in length to the following 3 segments together; club of funiculus indistinctly 4-jointed. Epinotal declivity armed dorsally with two slight, obtuse tubercles. Volsellae of genitalia as illustrated; sagittae with 21-25 serrations.

Surface of head shining, densely punctate, feebly rugose-reticulate; thorax shining, nearly completely, though feebly, striate, punctate at the base of the striae; petiole strongly striate, shining, very feebly punctate; postpetiole and gaster smooth and shining.

Hairs moderately abundant, fine, acute.

Color of head black or dark brown, remainder of body dark brown, the pedicel, appendages and tip of gaster paler. Wings hyaline with a brownish cast; veins brown.

Type Localities: Not specified but probably including North Carolina which is mentioned in the original description. Washington, D. C., specimens in the Wheeler collection were labelled cotypes.

Other localities: NEWFOUNDLAND: Bay of Islands (no collector). NOVA SCOTIA: Portauisque, Penobsquis (C. R. Frost); Pleasantfield, North Brookfield (W. H. Prest). MAINE: Casco Bay (W. M. Wheeler); Old Town, Ash Point (M. W. Wing); Monmouth (C. A. Frost); Ocean Pt. (E. & G. Wheeler); Cadillac Mt. top, Mt. Desert I. (J. C. & N. A. Weber). NEW HAMPSHIRE: Mt. Washington (U. S. N. M.); Mt. Monadnock, Mt. Kearsarge, Contoocook (E. & G. Wheeler); Union, Intervale (N. A. Weber). MASSACHUSETTS: Ellisville, Penekese I., Boston (W. M. Wheeler); Forest Hills, Blue Hills (N. A. Weber, G. C.

Wheeler, W. M. Wheeler); Concord, Petersham, Marblehead, Falmouth (N. A. Weber). CONNECTICUT: Colebrook (W. M. Wheeler). ONTARIO: Middle Is., E. & W. Sister Is., Pelee Is. (M. Talbot); West Bay, Manitoulin (C. H. Kennedy); Macdiarmid, Brent, Toronto, (R. O. M. Z.); L. Temagami (A. T. Gaul); Grimsby, Ottawa (no collectors); Renfrew (M. Stewart). NEW YORK: Richf. Spr., Ithaca (U. S. N. M.); Hartsdale (A. T. Gaul); Staten Is., Tuckahoe (no collectors). NEW JERSEY: Matawan, Lakehurst, Halifax (W. M. Wheeler); Morgan (Weiss); Caldwell (U. S. N. M.); Lower Mills (W. L. Brown); Watchung Mts. near Westfield (C. R. Mekeel, N. A. Weber). MARYLAND: Charlton H. (Pergande Coll.); Silver Springs (W. L. Brown). DISTRICT OF COLUMBIA: Washington (Pergande Coll. P.); "Washington" (Forel's cotypes). VIRGINIA: Warm Springs (U. S. N. M.); "Virginia" (Pergande); Skyline Dr., 3360 ft., Shenandoah Mt. Park (N. A. Weber). NORTH CAROLINA: L. Toxaway (no collector); Mt. Mitchell, 3,400 feet (A. Forel). GEORGIA: Clayton, 2-3,700 feet (W. T. Davis). PENNSYLVANIA: St. Vincent (P. J. Schmitt); Ridley Twp., Delaware Co. (N. A. Weber); State College, Centre Co. (The Rock), Philadelphia (W. L. Brown); White Haven (Bradley). MISSISSIPPI: Rara-Avis (M. R. Smith). OHIO: E. Sister I., Holland, Willard, Marblehead (M. Talbot); Southcentral Region (L. G. & R. G. Wesson). INDIANA: Miller, Valparaiso, Ogden Dunes, Smith (M. Talbot); Chesterton (R. E. Gregg); Ogden Dunes, Dune Acres (D. Lowrie); Lafayette (H. O. Deay). ILLINOIS: Champaign (Hart); Havana (Hart & Brown); Urbana (Hart, Farrar); Bilets Sta. (Forbes); Peoria L. (Pergande Coll.); Galena, Freeport, Apple R., Can. State Park (Ross & Townsend); White Heath (H. H. Ross); Charlestown (Ross & Mohr); Marshall (Peppoon & Mohr); Oakwood (T. H. Frison); Hickory Creek, Palos Park (M. Talbot); Rockford (W. M. Wheeler). MICHIGAN: Warrens Dunes, Flat Rock (M. Talbot, C. H. Kennedy). IOWA: Spirit L., Boone, Clinton, Sabula, Inwood (W. F. Buren); Ames (W. F. Buren, T. Pergande). WISCONSIN: Madison (A. C. Burrill); White Fish Bay (W. M. Wheeler); Superior, Foxboro (R. E. Gregg). MANITOBA: Treesbank (C. G. Hewitt); The Pas (R. H. Daggy). MINNESOTA: North Branch (W. E. Hoffmann); Itasca Park (E. & G. Wheeler); Red L. (Beltrami Co.), Shell L. (Becker Co.), Big Sand L. (Hubbard Co.) (N. A. Weber); Birchcliff, Lake St. Croix (A. Johnson, N. A. Weber); Duluth (Freeman, Roine, Gregg); Rice L., Holyoke, Knife R., Saganaga L. (R. E. Gregg). NORTH DAKOTA: Mikkelson (J. E. Goldsberry); Kelly, Turtle Mts., Bicycle, Arvilla, (E. & G. Wheeler); Towner, Bismarck, Sioux Co. nr. Breien, Kildeer Mts. (N. A. Weber); Cass Co. (C. Schonberger); Inkster, Manvel (C. V. Johnson). SOUTH DAKOTA: Hill City (Pergande Coll., N. A. Weber); Deadwood, 5,000 feet (E. & G. Wheeler). KANSAS: "Kansas" (G. F. Gaumer). WYOMING: Devils Tower (W. S. Creighton). COLORADO: Rocky Mt. Nat. Park; Glacier Basin Camp. (N. A. Weber); Custer Co. (T. D. A. Cockerell); Granby (W. S. Creighton); "Colorado" (U. S. N. M.); Manitou, Florissant, Cheyenne Canyon, Buena Vista (W. M. Wheeler). NEW MEXICO: Cloudcroft, 9,000 feet, Cox Canyon, 9,300 feet, Sacramento Mts. (W. M. Wheeler). ARIZONA: Coconino Forest (W. M. Wheeler); San Francisco Mts., 13,000 feet (W. M. Mann); Jacobs L., Kaibab Forest (N. A. Weber). MONTANA:

Bear Paw Mt. (Pergande Coll.); Flathead Lake (W. S. Creighton). IDAHO: Moscow (J. M. Aldrich). UTAH: Lehi (W. A. Kooker); Bryce Canyon, 8,100 feet (N. A. Weber).

The winged forms appear from July to September (Connecticut: Aug. 24-29; New York: Sept. 26; Ohio: Aug. 1-Sept. 21; Ontario: Aug. 3-Sept. 5; Illinois: July 27-Aug. 15; South Dakota: Aug. 9; North Dakota: July 25-Aug. 8; Saskatchewan: July 15; Montana: Aug. 23; Arizona: July 21-28; New Mexico: July 3-9; Utah: July 26).

This subspecies is comparatively distinct in the possession of a high lamina along the anterior margin of the bend and base of the antennal scape in the worker and of short antennal scapes in the male. Males are occasionally found, however, with these short scapes in colonies containing workers and females much like *fratricornis* and there is the usual variation in body structure in all castes in other colonies. The antennal scapes of the worker may be considerably compressed at the bend and the lamina reduced to a slight postero-medial carina; the epinotal spines may be distinctly shorter than the declivity ventral to them and may be straight, without deflected apices.

The variety *monticola* has been synonymized after the examination of all the type specimens. I cannot clearly separate them from the *emeryana* specimens from Illinois. Comparable ants from many localities in the East and the West are before me and agree well with the *monticola* descriptions and specimens.

The subsp. *latifrons* Starcke, which was described from four workers from Buffalo, N. Y., has been synonymized after the examination of the original description and of a figure of the antennal scape in "De Levende Natuur" (1927, fig. 49) which was labeled "*M. schencki* (Buffalo, metatype)", but of which Stårcke wrote "This is my *latifrons*." The description and the figure agree well with my specimens of *emeryana* from New York.

BIOLOGY

Myrmica emeryana usually nests in moist and shady situations. As a rule it inhabits ecological niches intermediate between the sunny, well-drained sites of *americana* and the damp to swampy places preferred by *brevinodis*. The ants are often found in woods forming irregular chambers in the soil, but may nest among grass roots. The entrance is sometimes protected by a collar of plant fibers, a more common feature of *americana* nests, however. The ants also make use of fallen branches, boards or stones to conceal the nest entrance and conserve humidity. The ants are timid, "feigning death" when disturbed, and are generally slow-moving.

Myrmica schencki var. *kutteri* Finzi

M. schencki var. *kutteri* Finzi, Boll. Soc. Adr. Sc. Nat., Trieste, 1926, 29: 111, ♀.

Switzerland: Zermatt (H. Kutter).

For a description of this form, see the reference above.

Myrmica schencki var. **obscura** Finzi

M. schencki var. *obscura* Finzi, Boll. Soc. Adr. Sc. Nat., Trieste, 1926, 29: 111-112, ♀ ♂.

Venezia Giulia: Mt. Nanos, Mt. Castellaro; Hungary: M. Tatra.
For a description of this form see the reference above.

Myrmica schencki var. **plana** Karawajew

M. lobicornis var. *plana* Karawajew, Konowia, 1926, 5: 283-285, fig. 1, ♀.

M. schencki var. *plana* Karawajew, Acad. Sc. Ukraine, 1929, 13: 208, 209, ♀.

Worker (after Karawajew):

Head broad, the occipital margin more even than in *M. sulcinodis*. Scape surpassing the occipital margin; at the base almost evenly bent and with an acute, somewhat long, angle on the bend. Dorsal surface of the thorax quite lacking a clear mesoepinotal impression. Epinotal spines moderately long, thin, somewhat acute apically, situated at about 45 degrees from the basal surface. Petiolar node with a somewhat rounded angle and a concavity on the anterior face, followed by a convexity basally. Postpetiole broadened posteriorly, somewhat broader than long, in profile the upper convexity is not equalled ventrally. Sculpturing coarser than the type (*M. lobicornis*), on the dorsal surfaces of the head and thorax coarse longitudinal rugosities. Pedicel somewhat coarsely wrinkled. Otherwise similar to the type (*M. lobicornis*). Color dark brown-ferruginous.

Type Locality: Taurish Gouv.: New Askania (Spat and Dobrschansky).

"I think the var. *plana* must be placed with *schencki* E. for, although the frons of this variety is not as strongly narrowed as in the type, yet the outer borders of the frontal carinae are more strongly curved outwards."

Myrmica schencki var. **salina** Ruzsky

M. scabrinodis var. *salina* Ruzsky, Formic. Imp. Rossici, 1905: 687, ♀ ♂.

Worker (after Ruzsky and Emery): Length 4.7-5 mm.

Frontal carinae much broadened in the form of lobes; lobe of scape less oblique than in *scabrinodis*, more than in *lobicornis*; surface between the reticulations on the sides of the head punctate but shining; middle part of the clypeus smooth, shining. Epinotal spines long, straight. Color somewhat dark.

Female (after Ruzsky): Length 5-6 mm.

Similar to the worker but colored somewhat darker. Wings brownish on the basal half.

Male (after Ruzsky and Emery):

Sculpturing of the head weaker than in the typical form, punctate-rugulose. Antennal scape thickened in the middle. Pilosity less dense, wings as in the female. Antennal scape lengthened as in the typical *scabrinodis*.

Type Locality: Gouv. Orenburg: Tobolsk.

Emery saw the type specimens and believed them a transition from the typical *scabrinodis* to *schencki*.

According to Ruzsky this ant lives beside salt lakes in deep holes in

the earth. The nests have one or more openings surrounded by a little mound of soil and small dried-up pieces of grass. In Siberia, at Lake Gorki, he found a nest among dried bushes, the cavities going deep into the earth. In the salt region of Tsara-Kul he found the nests in cavities in the soil among bushes (*Saussurea amara*).

***Myrmica schencki* subsp. *spatulata* M. R. Smith**

Myrmica schencki spatulata Smith, Ann. Ent. Soc. Amer., 1930, 23: 566-7, figs. 1-4, ♀ ♀.

Original Description.

Worker: Length 4.3-4.6 mm.

"Head, excluding mandibles, distinctly longer than broad, with rounded posterior border and posterior angles and convex sides. Eyes prominent, oval, convex, placed at a distance from the mandibles greater than their largest diameter. Mandibles well-developed, triangular, with 7 or 8 distinct teeth, the apical 3 the most strongly developed. Clypeus strongly convex; viewed laterally, it is decidedly protuberant. Frontal area triangular, impressed. Antennae 12-segmented; scapes robust, surpassing the posterior border of the head, each with a very large lobe at its base, which when viewed from above is very large and strikingly spatulate in outline; funiculus each with the last 3 distal segments enlarged but scarcely forming a distinct antennal club. Thorax viewed laterally with a distinct pro-mesonotal suture, the mesoepinotal region strongly impressed dorsally, less so laterally, but not forming a distinct suture. Epinotal spines long and acute, directed backward and upward, the spines about as long as the face of the declivity of the epinotum. Petiole, viewed in lateral profile, with flattened superior surface which meets the anterior surface in an almost distinct right angle; below with a short, blunt, anteriorly projecting spine. Postpetiole viewed from the same profile as the petiole, wider dorso-ventrally than antero-posteriorly. Gaster from above oval, the apex with a distinct sting.

"Mandibles, clypeus, frontal area, declivity of epinotum, appendages and gaster shining; remainder of body subopaque. Mandibles coarsely and longitudinally striated; clypeus similarly sculptured. Head coarsely rugulose-reticulate with finely punctate interspaces. Thorax and petiole coarsely rugulose, the rugulae with a distinct longitudinal trend.

"Pilosity yellow; coarse, suberect to erect, moderately abundant over all parts of the body, more reclinate on the legs. Pubescence of the same color as the pilosity, closely appressed to the body and so sparse as not to obscure the surface.

"Color highly variable in different specimens, in general, yellowish-brown to reddish-brown; appendages lighter, gaster black. The dorsum of the head, thorax, petiole and postpetiole more or less irregularly infuscated and as a rule darker than the rest of the body except the gaster.

Female: Length 5.5-6 mm.

"Very similar to the worker in all respects but proportionally larger. The head bears three not very distinct ocelli, which are arranged in a

nearly equilateral triangle. The sculpturing of the body although similar to that of the worker is much coarser. On the thorax, especially the sides, the rugulae are regular, almost equidistant, and have a longitudinal trend.

"Pilosity and pubescence hardly distinct from that of the worker.

"Color much deeper than that of the worker; dark reddish-brown, with the infuscation on the dorsal surfaces of the body darker, thus giving the ant from above a blackish appearance.

"Described from 6 workers and 4 dealated females, all of which were taken from a nest in the soil in a low heavily-wooded area, subject to occasional inundations, 5 miles west of Starksille, Mississippi. Cotype in the collections of the Department of Entomology of the Mississippi A. & M. College, the collection of Dr. W. M. Wheeler, and my collection."

This subspecies is known only from the type locality and from Raravis in the same state and the males have not yet been described. Transitions between this subspecies and *americana* from Rockford, Illinois, and from Colorado are in Dr. Wheeler's collection.

Myrmica schencki var. *starki* Karawajew

M. schencki var. *starki* Karawajew, Acad. Sc. Ukraine, 1929, 13: 208, ♀; Zool. Ana., 1931, 95: 29, ♀.

Worker (after Karawajew):

Head coarsely and longitudinally sculptured, laterally and posteriorly coarsely reticulate, with sharply impressed basal sculpture, somewhat shining. Thorax coarsely, irregular, especially on the dorsal surface, longitudinal sculpturing. Petiole, from above, very coarsely and sharply wrinkled in which a longitudinal trend can scarcely be distinguished; the postpetiole longitudinally and finely sculptured.

Dark brown, thorax and pedicel barely reddish, appendages likewise reddish, hardly lighter than the thorax.

Otherwise as in the type.

Type Localities: Chibinic Mt. (Kolskij Peninsula), Border along, also tundra by, the Imandra Sea, 14, 22.VII.1928 (V. Starck). Baikal Sea Region: Tanchoj-Mischicha, Listwenitschnoje (W. Karawajew).

"Apparently nearest the var. *obscura* Finzi."

Myrmica schencki var. *subopaca* Arnoldi

M. schencki var. *subopaca* Arnoldi, Folia Zool. et Hydrobiol. (Riga), 1934, 6(2): 172, ♀.

A form from the U. S. S. R. unknown to me.

Myrmica schencki subsp. *tahoensis* Wheeler

Myrmica scabrinodis schencki var. *tahoensis* Wheeler, Proc. Amer. Acad. Arts and Sciences, 1917, 52: 504, ♀ ♀ ♂.

Original Description:

"Small; antennal scapes geniculately bent at the base and at the flexure with a small rounded lobe, appearing as an acute tooth when the

scape is seen from the side. Frontal area very distinct, triangular. Frontal carinae large, lobular. Epinotal spines slightly shorter than the base of the epinotum, as long as their distance apart at the base, rather slender, distinctly curved downwards at their tips. Petiole in profile blunt and rounded above.

"Head, thorax and pedicel very coarsely and in the main longitudinally rugose, the surface subopaque; frontal area opaque, finely and densely longitudinally rugulose; concavity of epinotum smooth and shining like the gaster.

"Hairs rather long, abundant and suberect on the body and legs as in the typical *schencki* var. *emeryana* Forel.

"Head and gaster black; mandibles, antennae, thorax petiole and post-petiole deep brownish red; legs slightly more yellowish red.

Female (dealt): Length 4.5-5 mm.

"Very similar to the worker; pronotum transversely, mesonotum and scutellum strongly, pleurae more feebly longitudinally rugose; petiole and postpetiole longitudinally rugose above, densely and finely punctate on the sides and below as in the worker. Color like that of the worker, except that the thoracic dorsum and some spots on the pleurae are black.

Male: Length 3.5-4 mm.

"Antennae very short, the scapes especially, which are feebly bent at the base and no more than three times as long as broad and shorter than the three basal funicular joints together; club 4-jointed. Frontal area large, distinct, triangular. (Sagittae of the genitalia with 21-23 serrations; volsellae as illustrated). Sculpture and pilosity much as in the variety *emeryana*. Color dark brown; head black; mandibles, tarsi and articulations of legs brownish yellow; palpi whitish. Wings pale hyaline throughout, not infuscated at the base as in *emeryana*.

"Described from numerous workers, several males and two females from several localities about Lake Tahoe (Tallac, Angora Lake, Glen Alpine Springs, Fallen Leaf Lake) (California, July 24-28, 1915). The colonies are small and nest under stones in shady places."

Dr. Wheeler collected this handsome subspecies again on July 23, 1917, at Alta Meadow south of Lake Tahoe, California. The antennal scape in the males of this collection varied in length to the equivalent of from 3-4 of the following joints together.

Myrmica rugulosa Nylander

M. rugulosa Nylander, Act. Soc. Sc. Fennicae, 1849, 3: 32, ♀ ♂; Pinzi, Boll. Soc. Adr. Sc. Nat., Trieste, 1926, 29: 91-93, fig. 4; Stårcke, De Levende Natuur, 1927, 13, fig. 42.

M. scabrinodis rugulosa Karawajew, Konowia, 1926, 5: 285; Kuznetsov-Ugamskij, Zool. Anz., 1929, 33: 45.

Worker (after Nylander, 1856): Length 3.5-4.3 mm.

Similar to the preceding (*M. ruginodis*) but smaller, more opaque, paler, frontal area indistinct.

Female (after Nylander, 1856): Length 5.5-6 mm.

Similarly distinct from the preceding female, frontal area inconspicuous, pedicel less rugose; epinotal spines as long as in the worker.

Fore wings 5 mm. long, from the base to the middle very lightly lutescent.

Male (after Nylander, 1856): Length 4.5-5 mm.

Similar to the male of *M. scabrinodis*, pilosity of the tibiae much shorter, decumbent; mandibles about 5-dentate; scape as long as the first three joints of the funiculus.

Distribution: North and Middle Europe; Daghestan.

Myrmica rugulosa subsp. *caucasica* Arnoldi

M. rugulosa subsp. *caucasica* Arnoldi, Folia Zool. et. Hydrobiol. (Riga), 1934, 6(2): 165, ♀ ♂.

A form from the U. S. S. R. unknown to me.

Myrmica rugulosa subsp. *constricta* Karawajew

M. rugulosa var. *constricta* Karawajew, Travaux Syst. et faun., Ukrainian Acad. Sci., Kiev, 1934, p. 74.

M. rugulosa var. *minuta* Karawajew, Acad. Sc. Ukraine, 1929, 13: 204, ♀ ♂, (nec *M. laevinodis* var. *minuta* Ruzsky, Formic. Imp. Rossici, 1905: 670, ♀).

Worker (after Karawajew): Length 3-3.5 mm.

Frons as in the var. *ruguloso-scabrinodis* Karawajew, sculpturing weaker than in the type, color lighter and more even, the gaster hardly darker than the rest of the body.

Male (after Karawajew): Length 4 mm.

Scape as long as the three following joints together; these latter of a length comparative with those of the var. *ruguloso-scabrinodis*. Length of the fore wings: 4 mm.

Type Localities: Kiev region, on both sides of the Dneiper, pine forest behind Nikolskaja Slobodka, 1.VIII. 1919 (W. Karawajew).

These came from a hilly region; the nest, without a mound, was under coarse grass in sandy ground. About the entrance were arranged bits of reeds and grass stems in oblique positions. Upon digging up the colony and transferring it to an artificial nest he found two queens which were lost in the intervening years.

Similarly in North Dakota I found *M. sabuleti* subsp. *americana* surrounding the nest opening with a collar of grass particles.

Myrmica rugulosa var. *hellenica* Forel

M. scabrinodis rugulosa var. *hellenica* Forel, Rev. Suisse Zool., 1913, 21: 431, ♀ ♀.

Worker (after Forel): Length 3-5 mm.

Frontal area completely and densely striate as in *sulcinodis* Nyl. but the size and general aspect are those of *rugulosa*, likewise the form of the scape.

Female (after Forel): Length 4-5 mm.

Same differences as in the worker.

Type Localities: Greece: Patras, Corfou.

***Myrmica rugulosa* subsp. *limanica* Arnoldi**

M. rugulosa subsp. *limanica* Arnoldi, Folia Zool. et Hydrobiol. (Riga), 1934, 6(2): 162, ♀ ♀ ♂♂.

A form from the U. S. S. R. unknown to me.

***Myrmica rugulosa limanica* var. *chersonensis* Arnoldi**

M. rugulosa limanica nat. *chersonensis* Arnoldi, Folia Zool. et Hydrobiol. (Riga), 1934, 6(2): 164, ♀ ♂.

A form from the U. S. S. R. unknown to me.

***Myrmica rugulosa limanica* var. *strandii* Arnoldi**

M. rugulosa limanica nat. *strandii* Arnoldi, Folia Zool. et Hydrobiol. (Riga), 1934, 6(2): 164, ♀.

A form from the U. S. S. R. unknown to me.

***Myrmica rugulosa* var. *slobodensis* Karawajew**

M. rugulosa var. *slobodensis* Karawajew, Travaux Inst. Zool. Biol., Kiev, 1936.

A form from the U. S. S. R. unknown to me.

***Myrmica rugulosa* subsp. *ruginodiformis* Karawajew**

M. rugulosa var. *ruginodiformis* Karawajew, Acad. Sc. Ukraine, 1929, 13: 204-205, ♀ ♀ ♂♂.

Worker (after Karawajew): Length 3.5-4 mm.

Epinotal spines clearly shorter than in the type. The clypeus, in many examples, strongly triangular, the apex, however, being rounded. Head and gaster dark brown.

Female (after Karawajew): Length 5-5.5 mm.

Color as in the worker, except that on two of the examples the middle of the posterior half of the mesonotal scutum and the scutellum are reddish yellow. In the other specimens these areas are prolonged anteriorly and appear as three dark stripes. Fore wings 5.5 mm. long. Otherwise as in the worker.

Male (after Karawajew): Length 4.5-5 mm.

Scape somewhat longer than the 5 following segments together. Epinotum with weak, blunt gibbositities. Petiole conic, with rounded node.

Sculpturing comparatively fine and somewhat irregular, the pedicel dorsally smooth and shining, the sides finely and longitudinally striate. Dark brown, the antennae and legs somewhat lighter, the mandibles yellowish. Fore wings 4.5 mm. long.

Type Locality: Karkara, east of Issyk-kul, upper course of the Kegeni River, 1,950 meters, 16.VIII.1925. (N. Kuznetsov-Ugamskij).

Taken on a mountain steppe among *Festuca*.

The male of this form has so much longer antennal scapes (equal to the 5 following segments instead of 3), that it may belong to another species.

Myrmica rugulosa var. *rugulosa-scabrinodis* Karawajew

M. rugulosa var. *rugulosa-scabrinodis* Karawajew, Acad. Sc. Ukraine, 1929, 13: 205, 206, fig. 1, ♀ ♂.

Worker (after Karawajew):

Differing from the type in that the frontal carinae are somewhat divergent and at the apices somewhat thicker.

Male (after Karawajew): Length 4.5–5 mm.

Scape as in the type, as long as the 3 following segments together. The 1st segment (of the funiculus), on the outside, is quite as long as the 2nd, which is much thinner, the 3rd is two-thirds as long as the 2nd. Anterior division of the mesonotum between the Mayrian furrow is smooth and shining, lateral divisions finely striate longitudinally, the scutellum coarsely striate longitudinally, the postpetiole almost entirely smooth and shining.

"I think this is the form which Ruzsky (1905) regarded as the typical form from the Caucasus."

Type Localities: Caucasus: Mzymta River, Tshernomorskij Kreis, 10.IX.1910, ♀ ♀ and 1 winged ♂ (Satunin); Georgijevski-Osetinskij Aul, Kuban Region, 28.VII.1903, ♀ ♀ and 2 ♂ (Koznakov and Dieterich); Jailatsch-Chaman-Tshaj, 6,000 feet, Betsho, Tshaba, Svanetien, Shusha, Gouv. Jelisavetpol; Sotshi, Tshernomorskij Kreis, Armenia: Goktsha, Sevan peninsula.